US005790906A

United States Patent [19]

Chan

[11] Patent Number: 5,790,906

[45] Date of Patent: Aug. 4, 1998

[54] **CAMERA**

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[73] Assignee: **Foster Assets Corporation**, Hong Kong, Hong Kong

[21] Appl. No.: **846,901**

[22] Filed: **May 1, 1997**

[51] **Int. Cl.**[6] **G03B 41/00**

[52] **U.S. Cl.** **396/322**; 396/340; 396/429

[58] **Field of Search** 346/322, 335, 346/340, 310, 315, 316, 429

[56] **References Cited**

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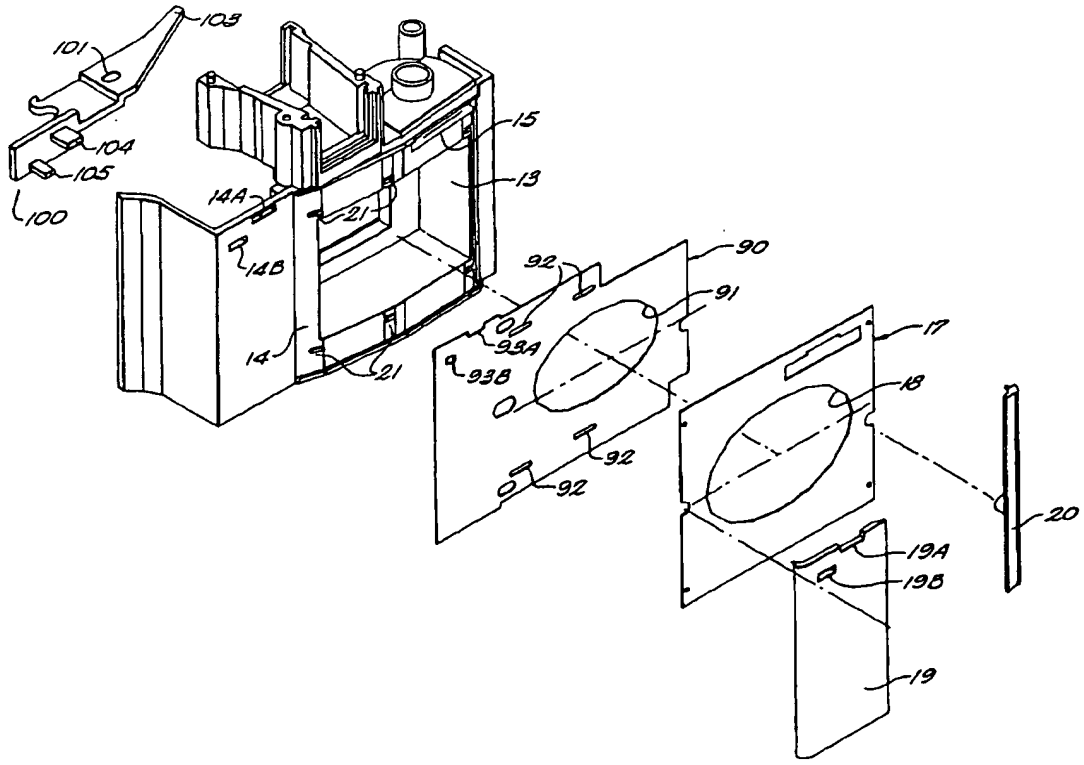
Primary Examiner—David M. Gray

Attorney, Agent, or Firm—Samuels, Gauthier, Stevens & Reppert

[57] **ABSTRACT**

A camera having an operating mechanism which comprises a body providing a film take-up chamber for containing an initially empty film cartridge, an exposure chamber having an open rear side, and a film supply chamber for containing a roll of film pre-exposed with border images on respective frames to define respective unexposed areas for subsequent photographic exposure. The operating mechanism includes a shutter mechanism, a film-advancing member for advancing the film frame-by-frame from the film supply chamber to the film take-up chamber across the exposure chamber rear side, and a trigger mechanism for operating the shutter mechanism in response to film advancement by the film-advancing member. A movable cover is used between the exposure chamber rear side and the film, which has a see-through portion to reveal the unexposed area for photographic exposure while protecting the border image of each successive frame. An operating lever is used to engage the cover to the film such that the cover is movable by the film, during film advancement, with the see-through portion maintained in accurate alignment with the unexposed area of each successive frame.

11 Claims, 7 Drawing Sheets



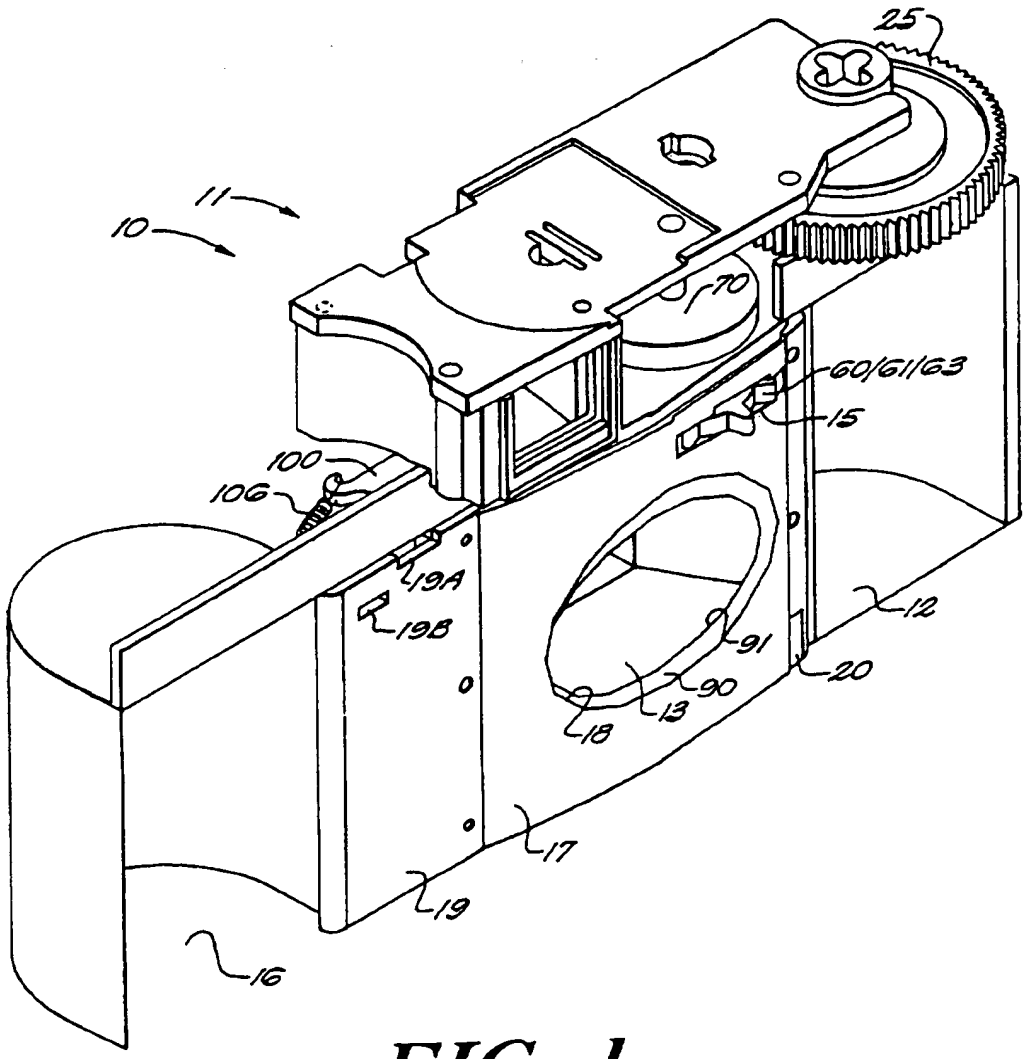


FIG. 1

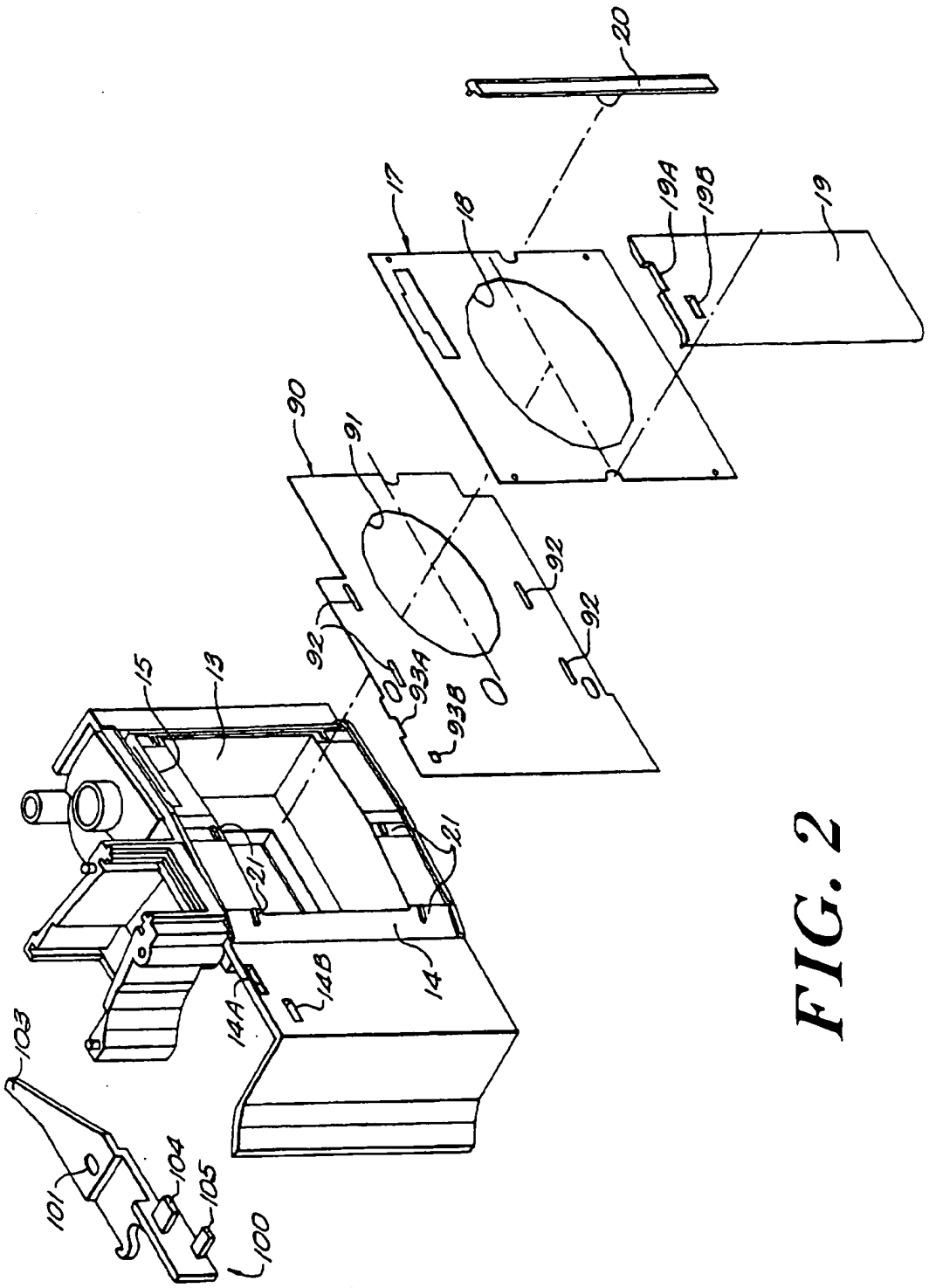

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FIG. 2

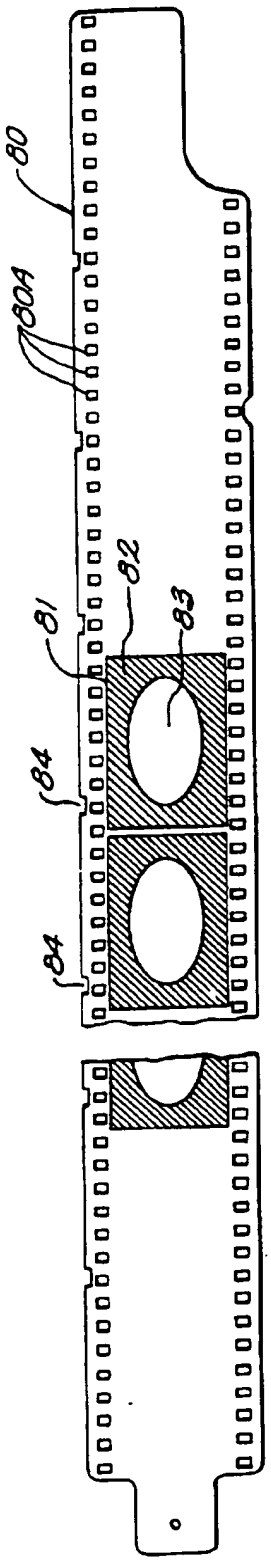


FIG. 3

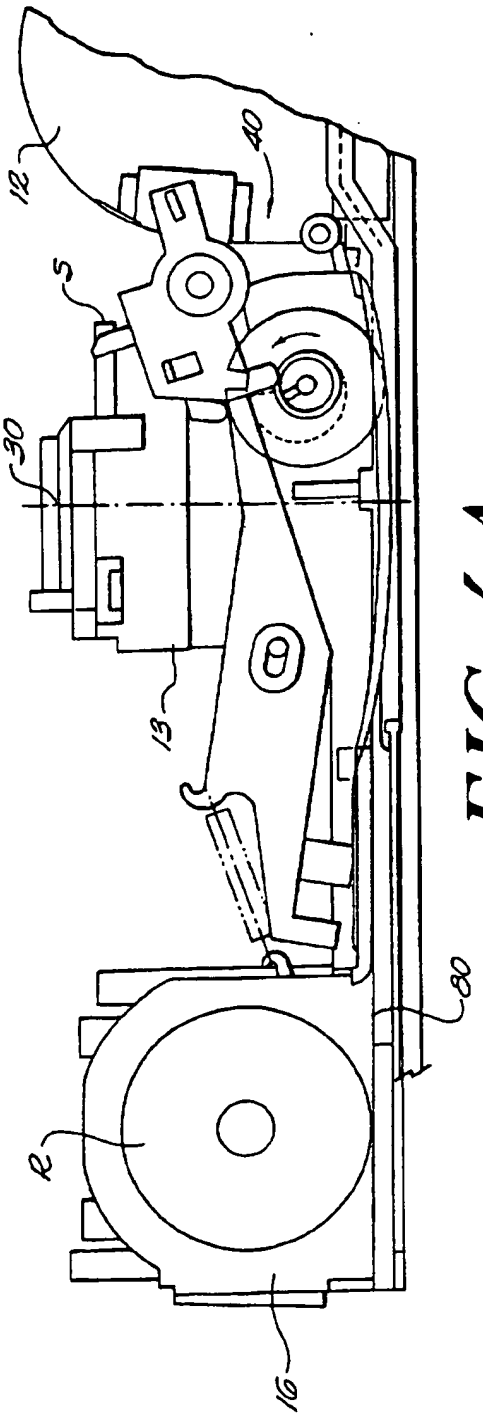


FIG. 4A

FIG. 4B

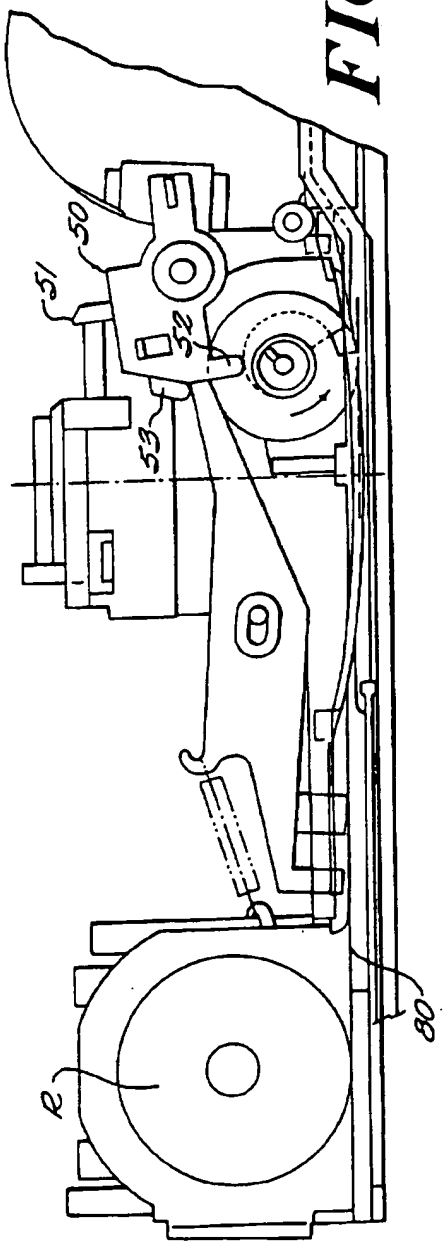


FIG. 4C

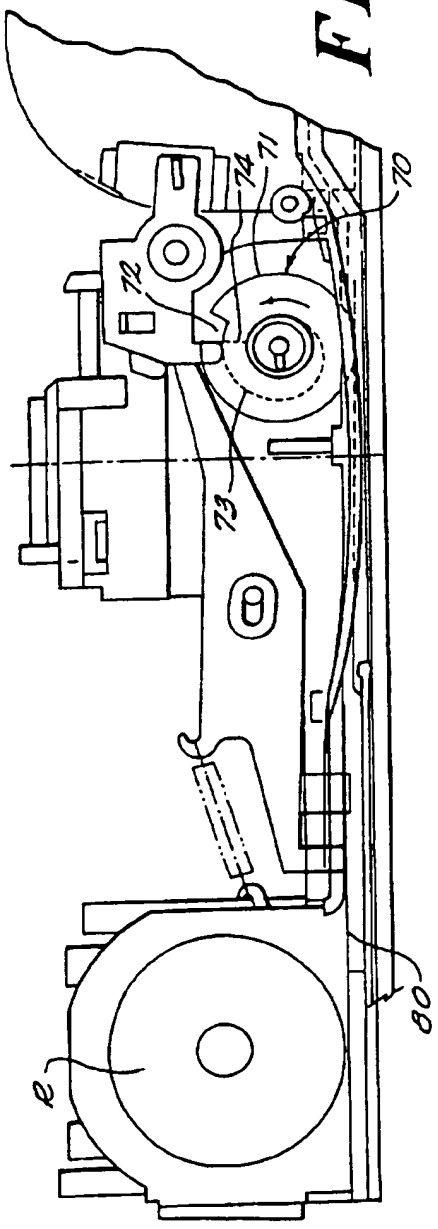


FIG. 4D

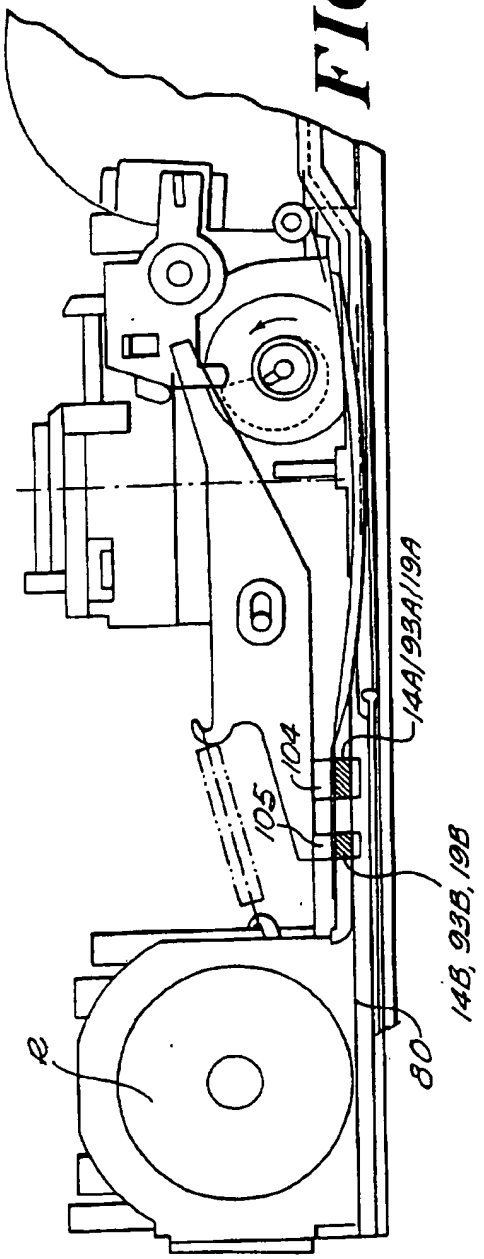
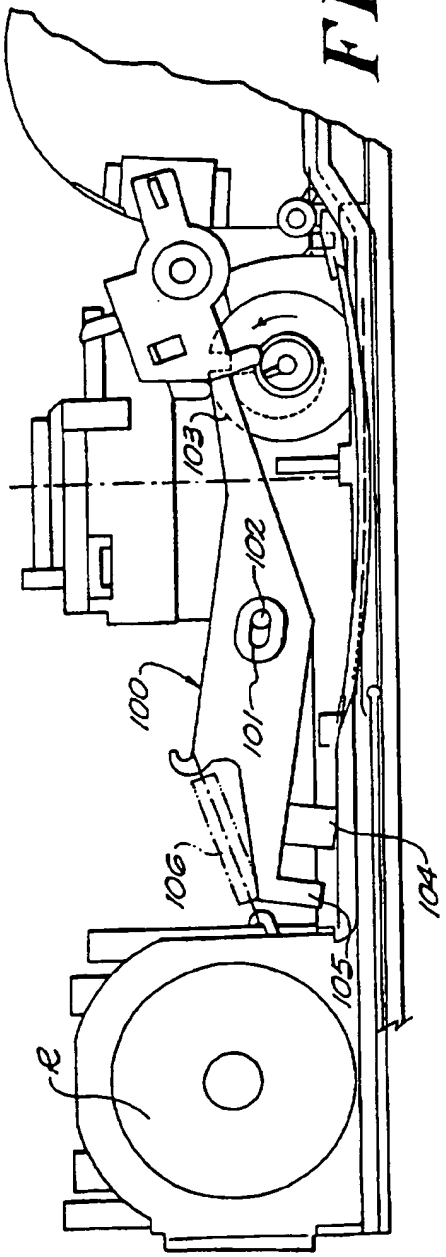

144/93A/194
104
105
148, 93B, 198
80
12

FIG. 4E


103
102
100
101
106
104
105
12

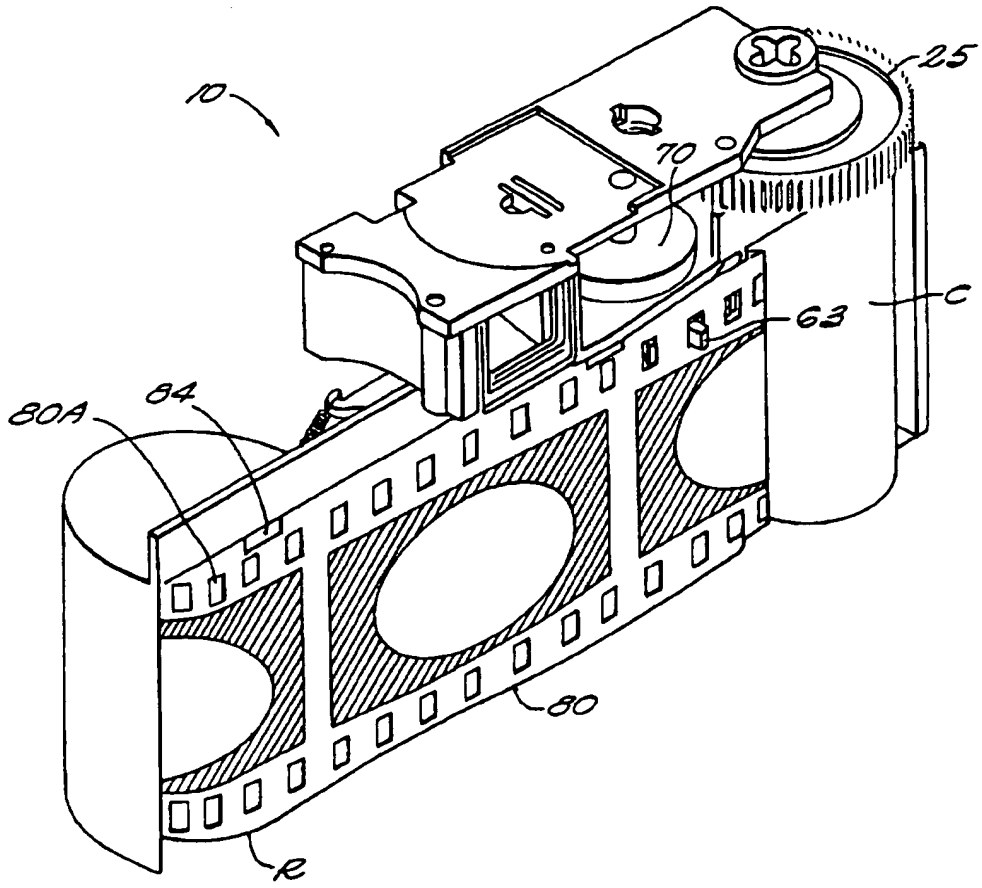


FIG. 5A

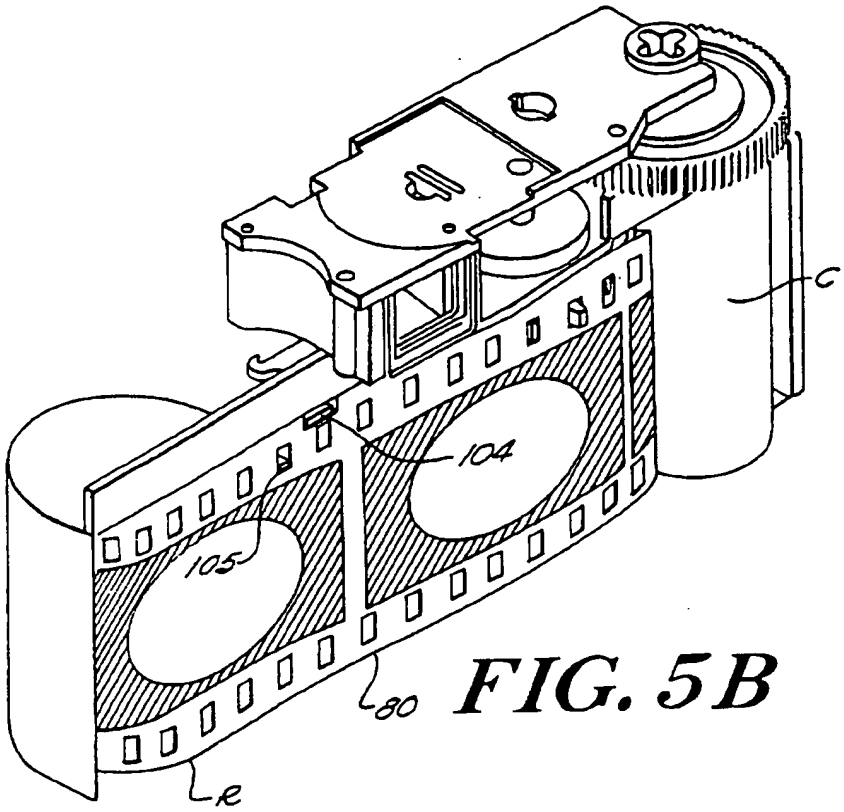


FIG. 5B

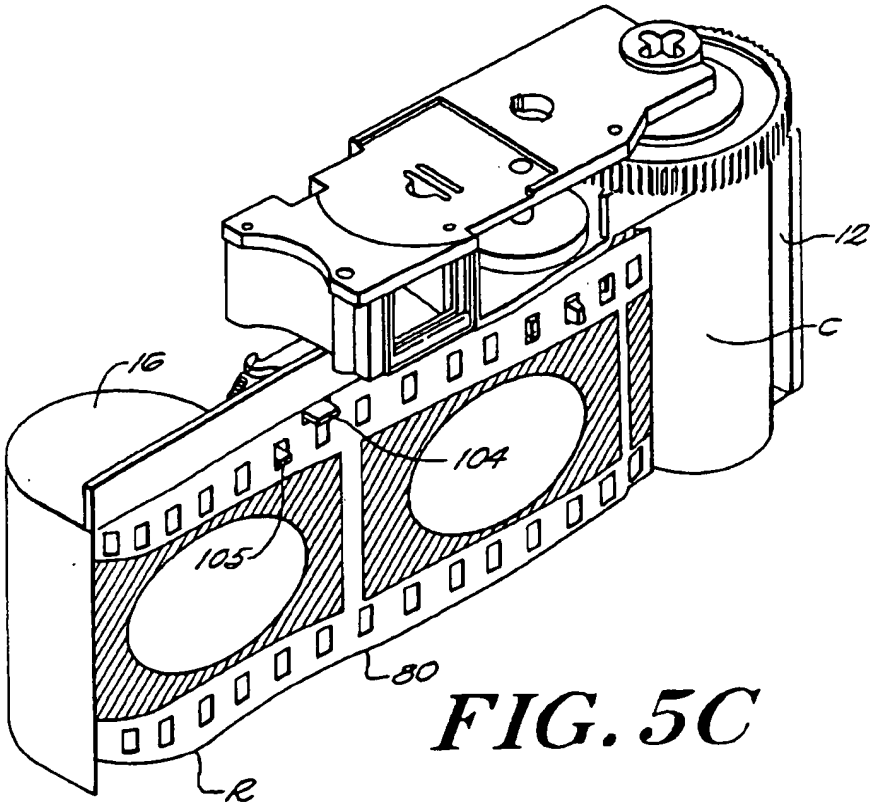


FIG. 5C

CAMERA

SUMMARY OF THE INVENTION

According to the invention, there is provided a camera having an operating mechanism comprising a body which provides a film take-up chamber for containing an initially empty film cartridge, an exposure chamber having an open rear side, and a film supply chamber for containing a roll of film pre-exposed with border images on respective frames to define respective unexposed areas for subsequent photographic exposure, said mechanism including a shutter mechanism to enable photographic exposure, a film-advancing member for advancing the film frame-by-frame from the film supply chamber to the film take-up chamber across the exposure chamber rear side, a trigger mechanism for operating the shutter mechanism in response to film advancement by the film-advancing member, a movable cover for use between the exposure chamber rear side and the film and having a see-through portion to reveal the unexposed area for photographic exposure while protecting the border image of each successive frame, and an engaging member arranged to engage the cover to the film such that the cover is movable by the film, during said film advancement, with the see-through portion maintained in accurate alignment with the unexposed area of each successive frame.

Preferably, the engaging member is arranged to engage the cover to the film only until near the end of the film advancement of each successive frame.

It is preferred that the engaging member is pivotable between a first position engaging the cover to the film and a second position not so engaging.

More preferably, the engaging member is also slidable for simultaneous movement with the film moving the cover.

It is further preferred that the engaging member has a slot in engagement with a separate hinge formation for said pivotable and slidable movement.

In a preferred embodiment, the engaging member has a part and is resiliently biassed by means of a spring to cause the part to engage the cover to the film.

More preferably, the film is formed with an opening at a predetermined position relative to each successive frame for engagement by the part of the engaging member.

Such openings are preferably provided by respective notches.

It is preferred that the engaging member includes a second part for engaging, under the action of the spring, with an appropriate traction hole of the film in addition to the engagement of the first part with each successive opening.

More preferably, said engagement of the second part of the engaging member is enabled by said engagement of the first part.

In a preferred construction, the operating mechanism further includes a fixed plate holding the movable cover close to the exposure chamber rear side, said plate having a see-through portion which is larger than the cover see-through portion.

BRIEF DESCRIPTION OF DRAWINGS

The invention will now be more particularly described, by way of example only, with reference to the accompanying drawings, in which:

FIG. 1 is a rear perspective view of the operating mechanism of an embodiment of a camera in accordance with the invention;

FIG. 2 is an exploded rear perspective view of the operating mechanism of to FIG. 1;

FIG. 3 shows a film strip for use with the operating mechanism of FIG. 1;

FIGS. 4A to 4E are top plan views of the operating mechanism of FIG. 1, showing its sequential conditions operating on the film strip of FIG. 3; and

FIGS. 5A to 5C are rear perspective views of the operating mechanism of FIG. 1, showing its sequential conditions operating on the film strip of FIG. 3.

DETAILED DESCRIPTION OF PREFERRED EMBODIMENT

Referring to the drawings, there is shown an operating mechanism **10** of a camera embodying the invention, which mechanism **10** has a body **11** providing a right-side film take-up chamber **12** for containing an initially empty standard 35 mm film cartridge C, a central exposure chamber **13** having a rectangular open rear side **14**, and a left-side film supply chamber **16** for containing a 35 mm film roll R wound on a spool. In use, a pre-exposed film strip **80** from the film roll R extends across the rear side **14** of the exposure chamber **13** for photographic exposure. A film-advancing wheel **25** is provided atop the film take-up chamber **12**, which is in co-axial engagement with the spool of the film cartridge C, for manual rotation to advance the film strip **80** frame-by-frame from the film roll R into the film cartridge C. The operating mechanism **10** includes a shutter assembly **30** and a trigger mechanism **40**, which assembly **30** incorporates a lens (not shown) in front of the exposure chamber **13**.

The shutter mechanism **30** contains a spring-loaded shutter plate which has an exposed end S arranged to be stroked by a part (**51** see below) of the trigger mechanism **40** for momentarily flicking the shutter plate (shutter release) and thus opening an exposure aperture behind the lens to permit photographic exposure on the film strip **80** through the exposure chamber **13**.

The trigger mechanism **40** is formed by a striker **50** which is horizontally pivotable and an assembly of a lower sprocket **60** and an upper cam **70** which are axially inter-engaged for simultaneous horizontal rotation. The striker **50** has first and second side projections **51** and **52** and is spring-loaded to turn (and also to move upwards), thereby urging the first projection **51** to stroke the shutter plate end S and urging the second projection **52** against the cam **70**.

The sprocket **60** has an external toothed wheel **61** formed with eight equi-angularly spaced outer teeth **63** and is provided above the right side of the exposure chamber **13** for activating the overall trigger mechanism **40**. A horizontal slot **15** is formed through the rear side **14** above the exposure chamber **13** to let at least one tooth **63** of the sprocket wheel **61** protrude out for engaging a respective traction hole **80A** of the film strip **80** extending behind the chamber **13**. Upon movement by the film-advancing wheel **25**, the film strip **80** rotates the sprocket **60** and in turn the cam **70** above in the same direction.

The cam **70** has an upper circular disc portion **71** having a side cutout **72** and a lower radially expanding cam portion **73** having a radial step **74**, said the cutout **72** being formed immediately in front of the step **74** below. The cam portion **73** is arranged to be in side contact with the second projection **52** of the striker **50** for, upon rotation by the sprocket **60** and through a cam action, turning the striker **50** in the opposite direction against the action of the spring. The striker **50** will stop turning when its second projection **52**

reaches and interlocks from below with the forthcoming cutout 72, under the continual upward action of the same spring. At this time, all the aforesaid rotating and turning actions stop and the film advancement is just completed.

At such time, the film strip 80 has just been advanced for one frame and the trigger mechanism 40 is ready for action to permit photographic exposure on the film strip 80. For this purpose, the user is required to depress a trigger button (not shown) for moving the striker 50 downwards to release the second projection 52 from the cutout 72, whereupon the striker 50 is allowed to turn back quickly under the action of the spring to have its first projection 51 stroking the shutter plate end S as described above.

The construction and operation of the operating mechanism 10 so far described are disclosed in greater detail in earlier U.S. patent application filed on 11 Apr. 1997 under Serial number (pending), the content of which is incorporated herein.

As best shown in FIG. 3, each frame 81 of the film strip 80 is pre-exposed with a border image 82 defining an oval central area 83 which is unexposed for subsequent normal photographic exposure. The rear side 14 of the exposure chamber 13 is provided with a fixed opaque cover 17, which has an oval central aperture 18, for protecting the pre-exposed border image 81 during photographic exposure of each successive frame 81. In prior art construction, such a cover aperture is made to have identical shape and size as the unexposed film area 83, for aligning horizontally with and revealing the exact whole of said film area. It has, however, been found that such alignment cannot always be achieved accurately because mis-positioning of the film relative to the apertured cover is inevitable for low cost cameras and in particular disposable cameras.

This problem is solved by the use of an apertured opaque cover 90 which is movable with the film strip 80 to avoid any mis-alignment therebetween. The movable cover 90 has an oval aperture 91 of identical shape and size as the unexposed film area 83. The fixed cover 17 preferably remains in use, but its aperture 18 is made relatively larger than the movable aperture 91. Mounting plate 19 and strip 20 are used on opposite left and right sides to secure the fixed cover 17 to the exposure chamber rear side 14, forming a thin gap therebetween. The movable cover 90 is held slidably inside the gap for limited horizontal movement in opposite directions. The vertical position of the cover 90 is maintained by means of four horizontal slots 92 slidably engaging with respective shorter horizontal ribs 21 on the exposure chamber rear side 14.

The left side of the movable cover 90 is formed with a flat top notch 93A and a short horizontal slot 93B, said slot 93B being formed on the left side of and below the notch 93A and at the same level as the slot 15 exposing the sprocket teeth 63. The exposure chamber rear side 14 is formed with relatively longer horizontal slots 14A and 14B at positions corresponding to that of the respective notch 93A and slot 93B. The mounting plate 19 is also formed with relatively longer flat top notch 19A and horizontal slot 19B at the same corresponding positions. For cooperation, the film strip 80 is formed with a series of flat top notches 84 at predetermined positions relative to the respective frames 81.

The operation of the movable cover 90 is controlled by means of a flat operating lever 100 extending above the exposure chamber 13. The lever 100 has a longitudinally extending short slot 101 at mid-length in engagement with a fixed hinge pin 102 upstanding from the left side of the exposure chamber 13, for limited horizontal sliding/pivotal movement about the hinge pin 102 between an inoperative position (FIGS. 4A and 4E) and an operative position (FIG. 4D). Right end 103 of the lever 100 is engaged with a third projection 53 of the striker 50. The lever's left end has, on the back side, first and second flat fingers 104 and 105 which are in alignment with and for extending out through respective slot/notches 14A/93A/19A and slots 14B/93B/19B (FIG. 4D).

The lever 100 is resiliently biassed to pivot towards its operative position by means of a spring 106, as shown, such that the right end 103 bears against the third projection 53 of the striker 50 and that the fingers 104 and 105 have a tendency to extend out through the respective slots and notches (FIG. 4D). Such pivotal movement is restrained by the engagement between the lever's right end 103 and the striker's third projection 53 (FIGS. 4A and 4E). Upon the aforesaid turning of the striker 50 in the initial direction, its third projection 53 will gradually release the lever's right end 103, whereby the lever 100 will pivot gradually to the operative position under the action of the spring 106 (from FIGS. 4A to 4D).

In operation, the film strip 80 is stretched across and behind the fixed cover 17. During film advancement, the striker 50 is simultaneously turned by the film strip 80 through the engagement of the sprocket teeth 63 with the film traction holes 80A. As described above, the lever 100 is allowed to gradually pivot to the operative position under the action of the spring 106, with the fingers 104 and 105 biassed to extend out through the respective slot/notches 14A/93A/19A and slots 14B/93B/19B. However, before the fingers 104 and 105 can extend fully out, the first finger 104 is blocked by the top edge of the film strip 80 (FIGS. 4B and 5A) until near the end of film advancement when a forthcoming film top notch 84 comes into alignment with and thus releases the first finger 104 (FIGS. 4C and 5B). At the same moment, an appropriate traction hole 80A also comes into alignment with the second finger 105. Accordingly, both fingers 104 and 105 can now extend fully out to also engage with the film strip 80 on the back, thereby engaging the movable cover 90 to the film strip 80.

Such engagement results in accurate horizontal alignment of the cover aperture 91 with the unexposed area 83 of the forthcoming frame 81. Afterwards, the film strip 80 continues to advance slight further, while carrying with it the movable cover 90 maintained in said alignment, until the film advancing action is finally completed (FIGS. 4D and 5C). During such further movement, the lever 100 is simultaneously moved lengthwise to the right by the film strip 80, which is made possible by reason of the length of the slot 101 relative to the hinge pin 102.

Upon depression of the aforesaid trigger button to take a photograph, the striker 50 turns back quickly, as described above, to have its third projection 53 re-engaging the lever's right end 103, thereby pivoting the overall lever 100 back to the inoperative position (FIG. 4E) against the spring 106 to have the fingers 104 and 105 withdrawn from engagement with the film strip 80. Under the action of the spring 106, the lever 100 is also moved lengthwise back to the left and be ready for the next operating cycle.

As the top notches 84 and 93A of the film strip 80 and movable cover 90 are open-sided and may therefore not be sufficiently strong to be held by the first finger 104 of the lever 100, the second finger 105 is additionally used, as a preferred option, to achieve firm and sound engagement with the film strip 80 and cover 90. Accordingly, the second finger 105 may be dispensed with, for example if the top notches 84 and 93A are made closed.

It is envisaged that, as the fixed cover **17** is merely used to hold the movable cover **90** in sliding position, the fixed aperture **18** may be made in any other shapes provided that it is larger than the movable aperture **91**. Also, as the use of the cover **90** movable by the film **80** during film advancement ensures the alignment of the aperture **91** with an unexposed film area **83** only in the travelling direction of the film **80**, the invention is also applicable to pre-exposed border images which do not surround the respective frames **81** completely.

The purpose of the aperture **91** of the cover **90** is to reveal each successive unexposed area **83** of the film **80** for, upon correct alignment of the aperture **91** with said area **83**, photographic exposure at the right place on the film **80**. Insofar as this purpose is concerned, the cover **90** does not need to have an aperture **91**, as such, provided that it has a see-through portion for revealing the unexposed areas **83**. For example, the cover **90** may be provided by a transparent sheet which is made opaque except at a central portion to form a see-through window for acting as the aperture **91**. The window may be printed with material for forming an image on the film area **83** during photographic exposure.

The invention has been given by way of example only, and various other modifications of and/or alterations to the described embodiment may be made by persons skilled in the art without departing from the scope of the invention as specified in the appended claims.

What is claimed is:

1. A camera having an operating mechanism comprising a body which provides a film take-up chamber for containing an initially empty film cartridge, an exposure chamber having an open rear side, and a film supply chamber for containing a roll of film pre-exposed with border images on respective frames to define respective unexposed areas for subsequent photographic exposure, said mechanism including a shutter mechanism to enable photographic exposure, a film-advancing member for advancing the film frame-by-frame from the film supply chamber to the film take-up chamber across the exposure chamber rear side, a trigger mechanism for operating the shutter mechanism in response to film advancement by the film-advancing member, a movable cover for use between the exposure chamber rear side and the film and having a see-through portion to reveal the unexposed area for photographic exposure while protecting the border image of each successive frame, and an engaging member arranged to engage the cover to the film such that the cover is movable by the film, during said film advancement, with the see-through portion maintained in accurate alignment with the unexposed area of each successive frame.

2. A camera as claimed in claim **1**, wherein the engaging member is arranged to engage the cover to the film only until near the end of the film advancement of each successive frame.

3. A camera as claimed in claim **1**, wherein the engaging member is pivotable between a first position engaging the cover to the film and a second position not so engaging.

4. A camera as claimed in claim **3**, wherein the engaging member is also slidable for simultaneous movement with the film moving the cover.

5. A camera as claimed in claim **4**, wherein the engaging member has a slot in engagement with a separate hinge formation for said pivotable and slidable movement.

6. A camera as claimed in claim **1**, wherein the engaging member has a part and is resiliently biassed by means of a spring to cause the part to engage the cover to the film.

7. A camera as claimed in claim **6**, wherein the film is formed with an opening at a predetermined position relative to each successive frame for engagement by the part of the engaging member.

8. A camera as claimed in claim **7**, wherein the openings are provided by respective notches.

9. A camera as claimed in claim **7**, wherein the engaging member includes a second part for engaging, under the action of the spring, with an appropriate traction hole of the film in addition to the engagement of the first part with each successive opening.

10. A camera as claimed in claim **9**, wherein said engagement of the second part of the engaging member is enabled by said engagement of the first part.

11. A camera as claimed in claim **1**, wherein the operating mechanism further includes a fixed plate holding the movable cover close to the exposure chamber rear side, said plate having a see-through portion which is larger than the cover see-through portion.

* * * * *

US005732298A

United States Patent [19]

Nishizawa et al.

[11] Patent Number: 5,732,298

[45] Date of Patent: Mar. 24, 1998

[54] **PICTURE FRAME SWITCHING MECHANISM**

[75] Inventors: **Akio Nishizawa**, Kawasaki; **Isao Soshi**, Tokyo; **Shuji Iijima**, Yamato; **Noriyasu Kotani**, Tokyo; **Junichi Omi**, Kawasaki, all of Japan

[73] Assignee: **Nikon Corporation**, Tokyo, Japan

[21] Appl. No.: **684,850**

[22] Filed: **Jul. 25, 1996**

Related U.S. Application Data

[63] Continuation-in-part of Ser. No. 569,906, Dec. 8, 1995, abandoned.

[30] **Foreign Application Priority Data**

Dec. 9, 1994	[JP]	Japan	6-306336
Dec. 9, 1994	[JP]	Japan	6-306337
Dec. 28, 1994	[JP]	Japan	6-329093
Apr. 13, 1995	[JP]	Japan	7-088310
Apr. 13, 1995	[JP]	Japan	7-088311
Jul. 25, 1995	[JP]	Japan	7-189066
Sep. 1, 1995	[JP]	Japan	7-225031

[51] **Int. Cl.**[6] **G03B 13/10**

[52] **U.S. Cl.** **396/380**

[58] **Field of Search** 396/380

[56] **References Cited**

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Primary Examiner—Russell E. Adams

Attorney, Agent, or Firm—Oliff & Berridge, PLC

[57] **ABSTRACT**

The picture frame switching mechanism according to the present invention includes: a plurality of picture frame definition members whose relative position in a plane perpendicular to an optical axis of an optical system is changed so as to switch picture frames; a drive section which drives a portion of the plurality of picture frame definition members; and a linked driving section which drives other portion of the picture frame definition members in linkage according to predetermined conditions with driving of the portion of the picture frame definition members.

44 Claims, 31 Drawing Sheets

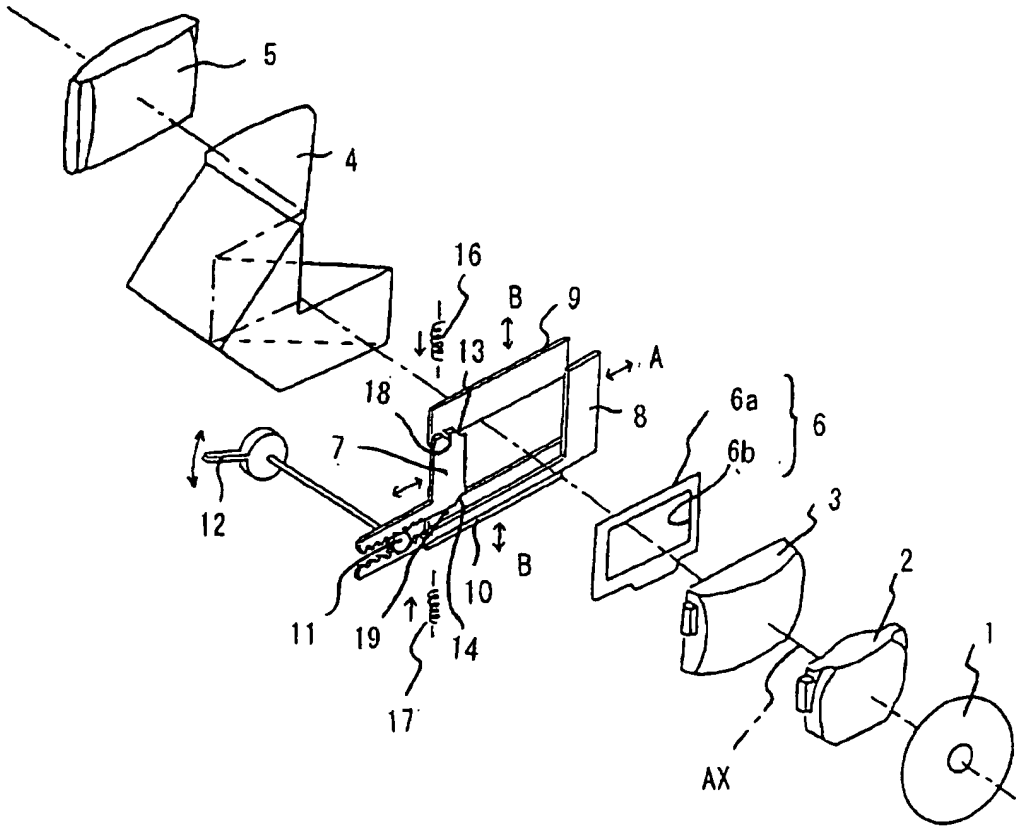


FIG.1

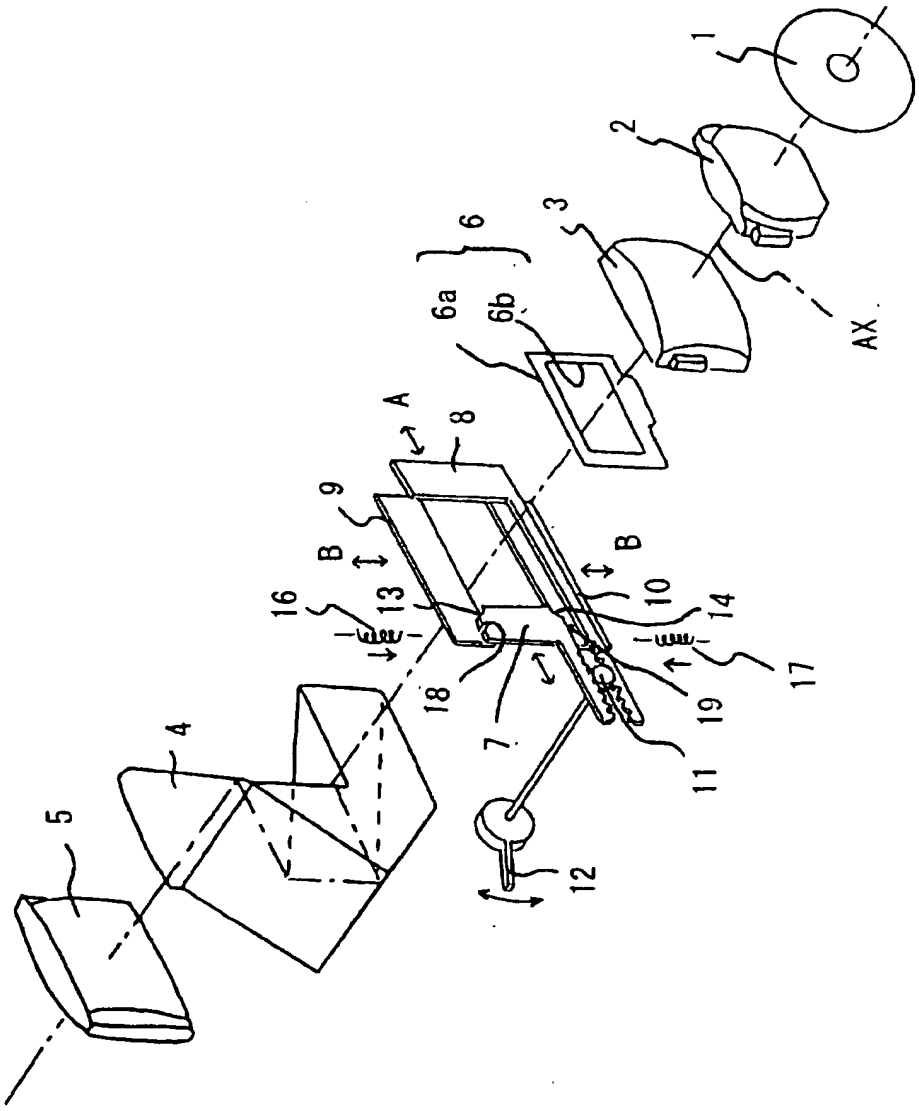


FIG.2

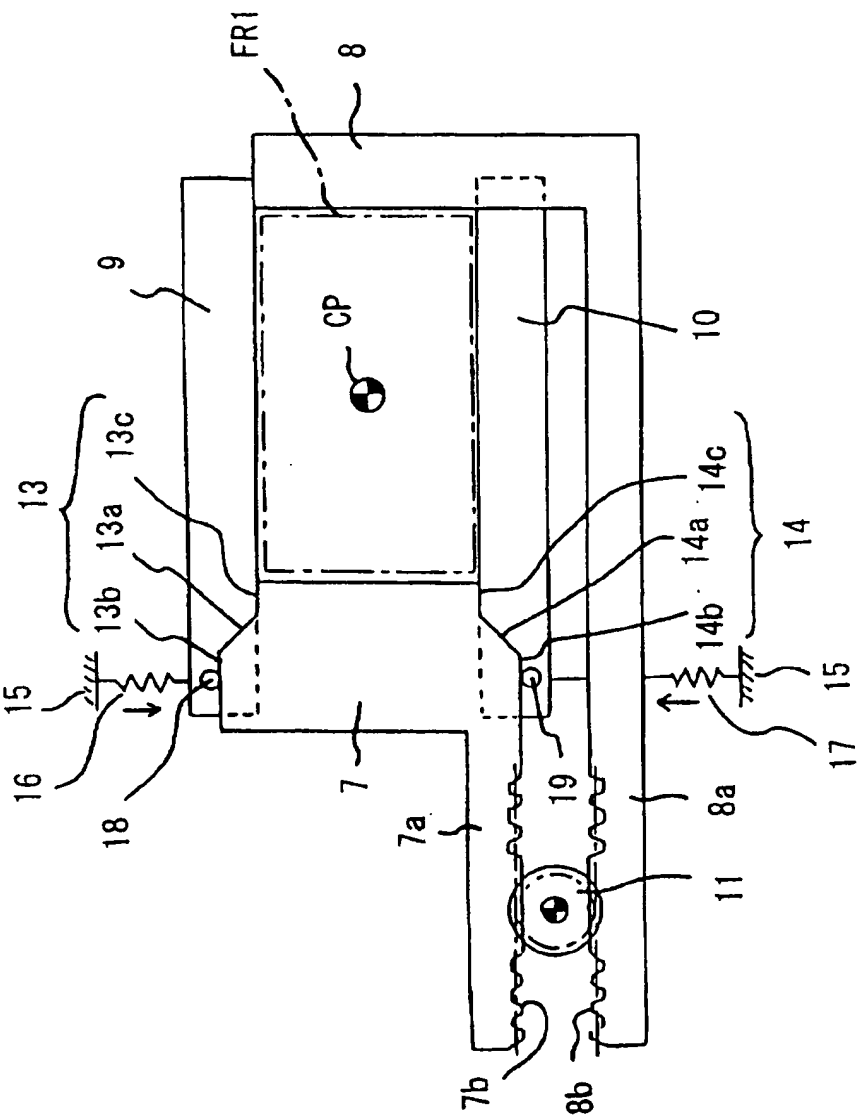

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7b
8b

FIG.3

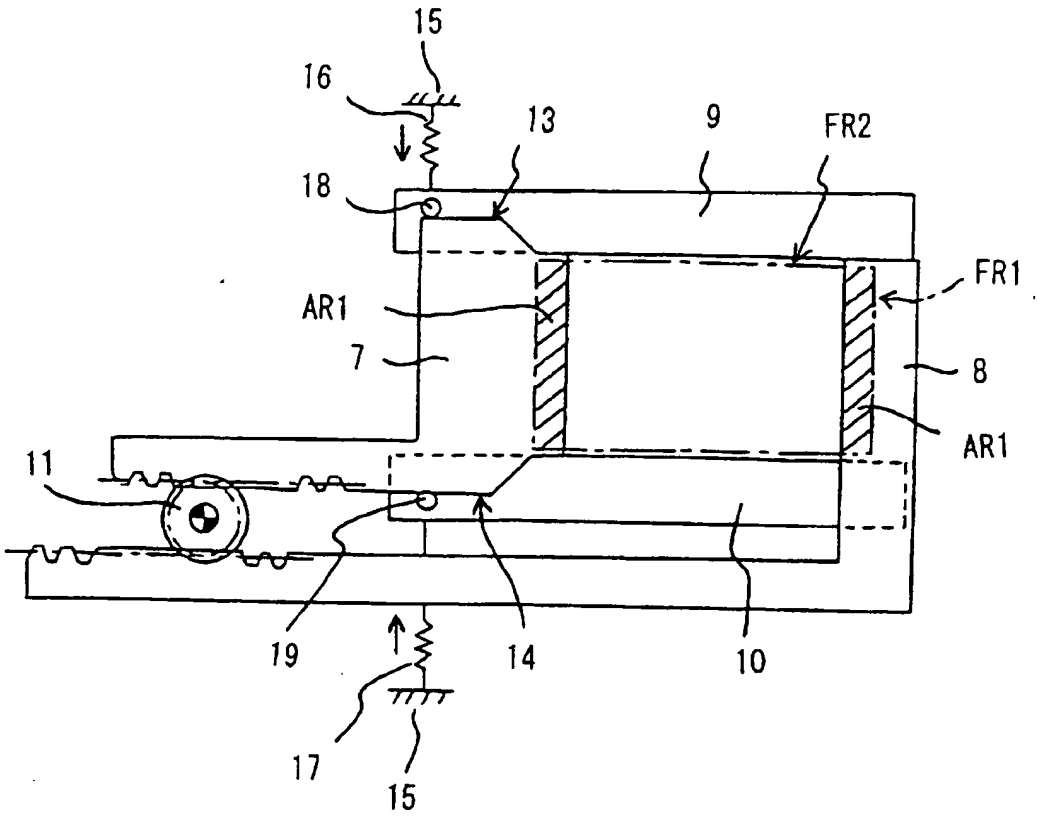


FIG.4

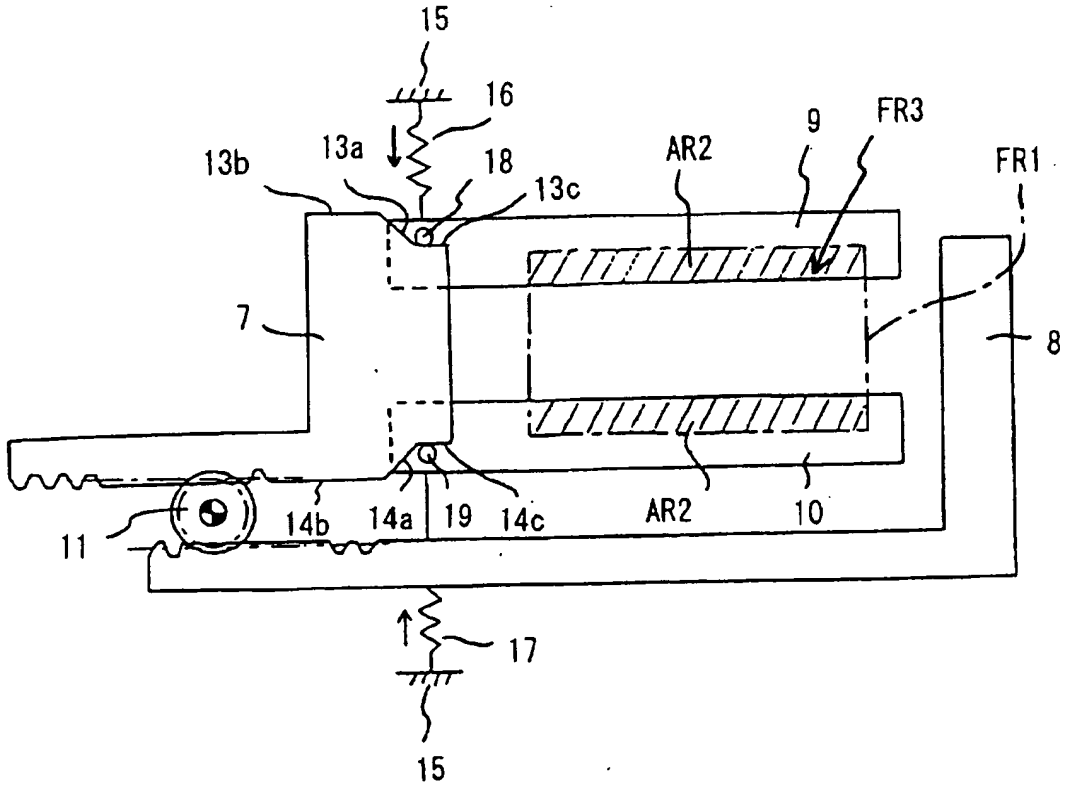


FIG.5

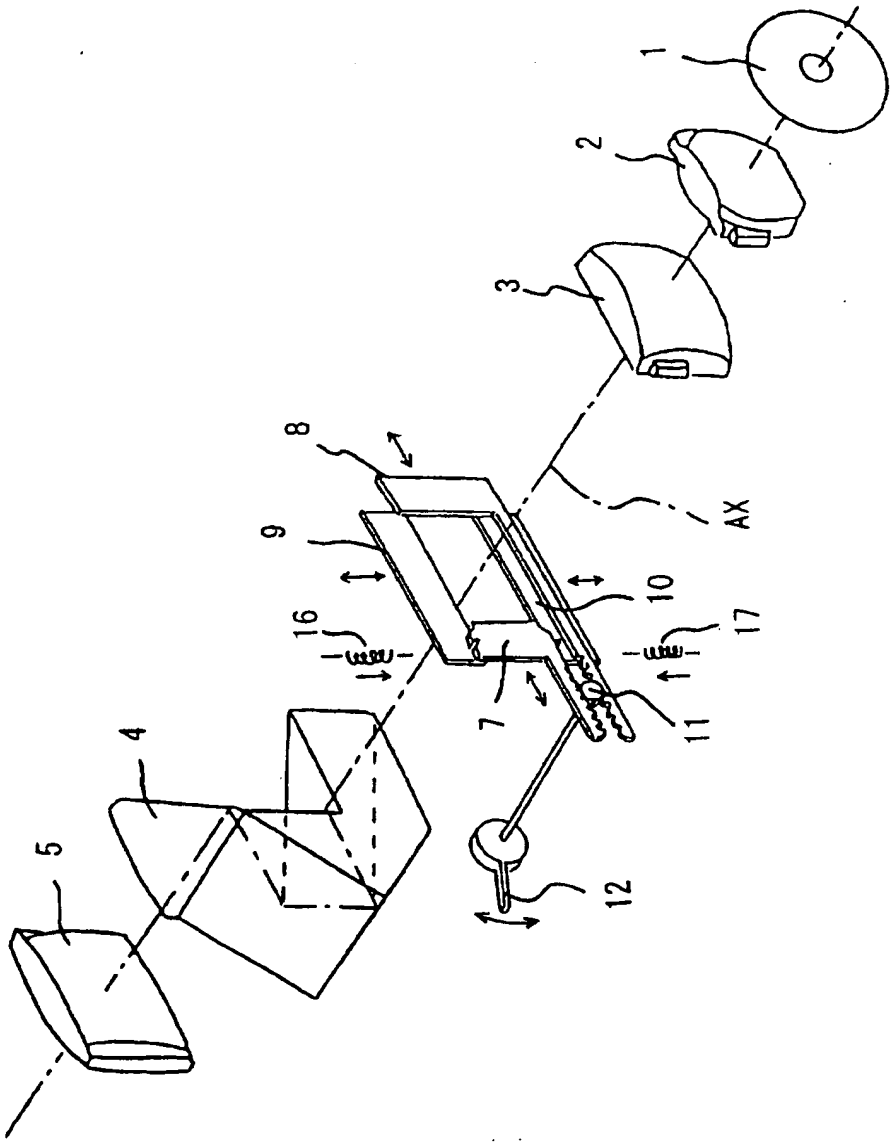


FIG.6

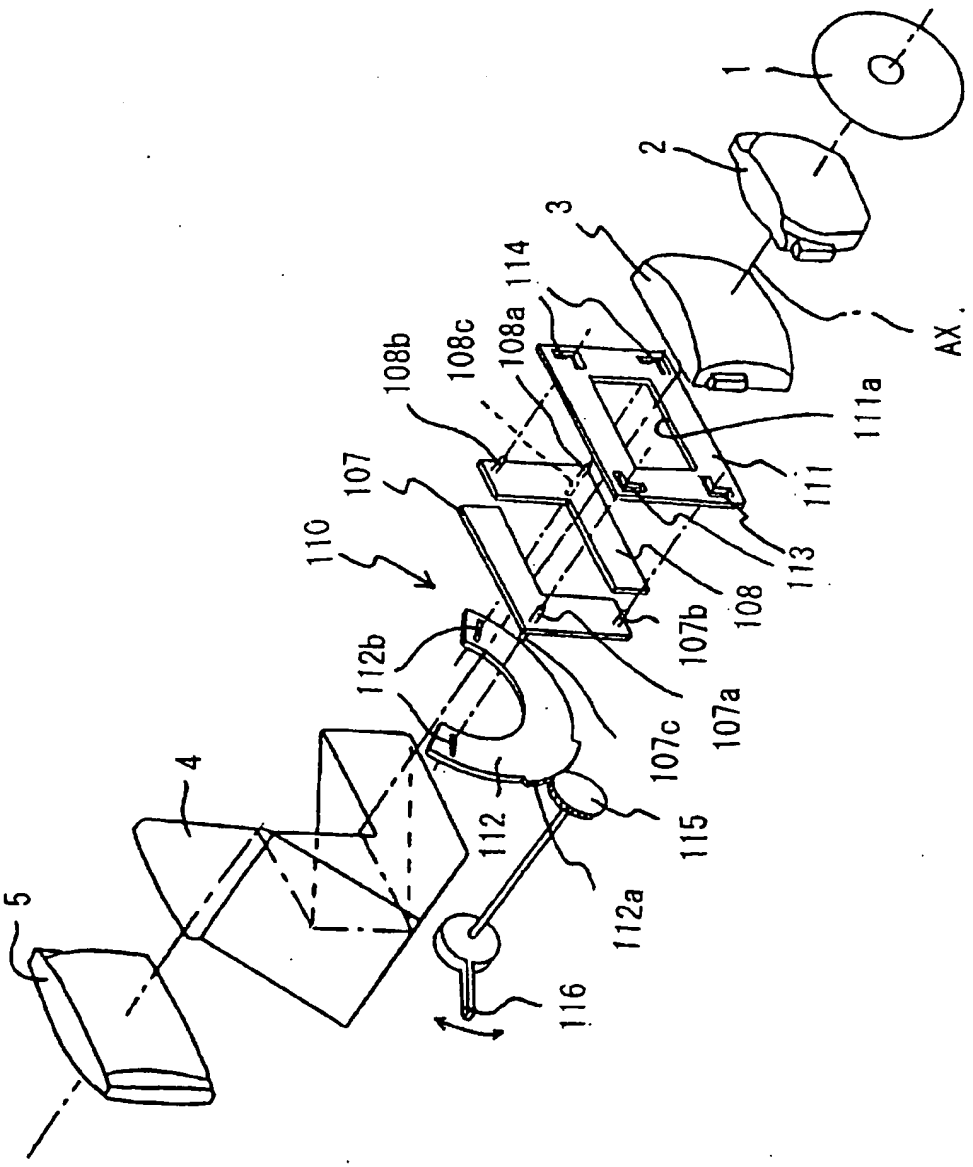

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3
4
5
AX
111a
111
113
108
107b
107a
107c
115
112a
116
112
112b
110
107
108b
108c
108a
114

FIG.7

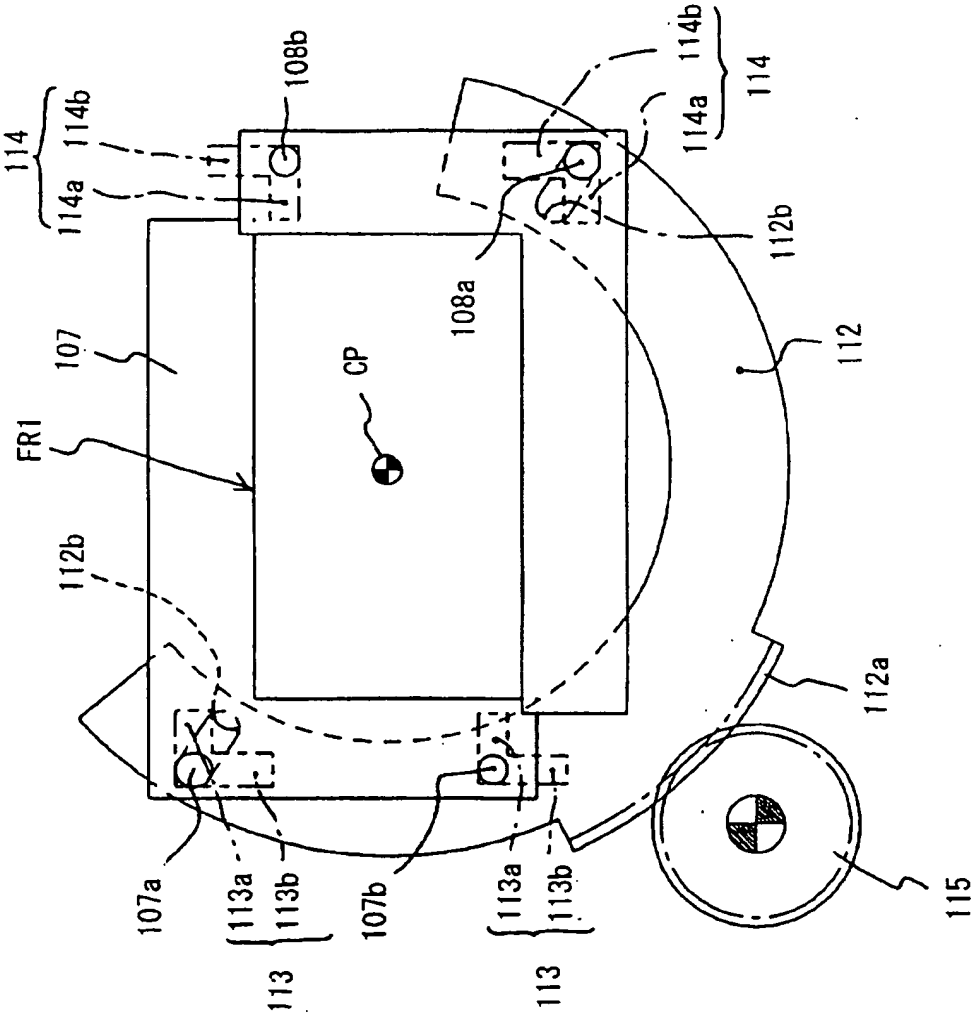

114
114b
114a
108b
114b
114a
114
112b
108a
107
CP
112
FR1
112b
112a
107a
113a
113b
113
107b
113a
113b
113
115

FIG.8

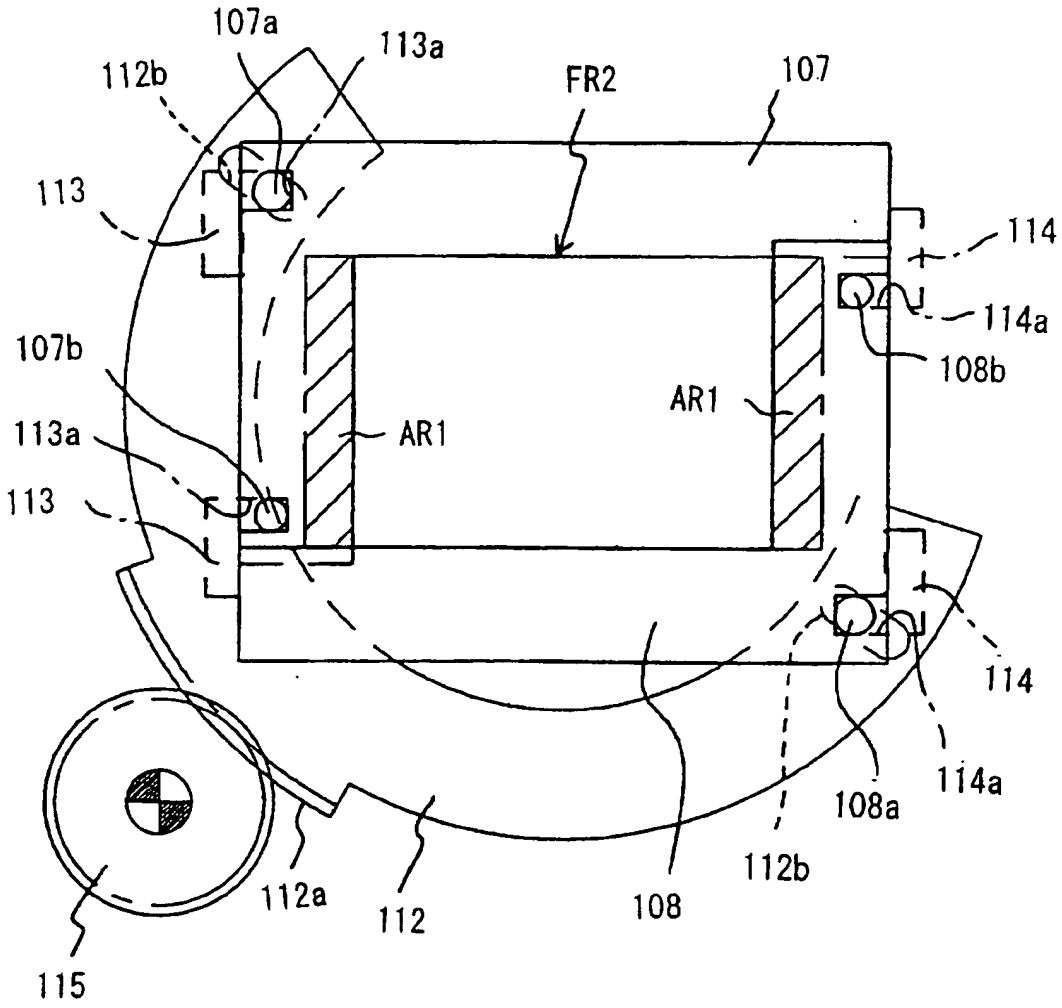

107a
113a
112b
FR2
107
113
114
114a
108b
107b
AR1
AR1
113a
113
114
114a
108a
112b
112a
112
108
115

FIG. 9

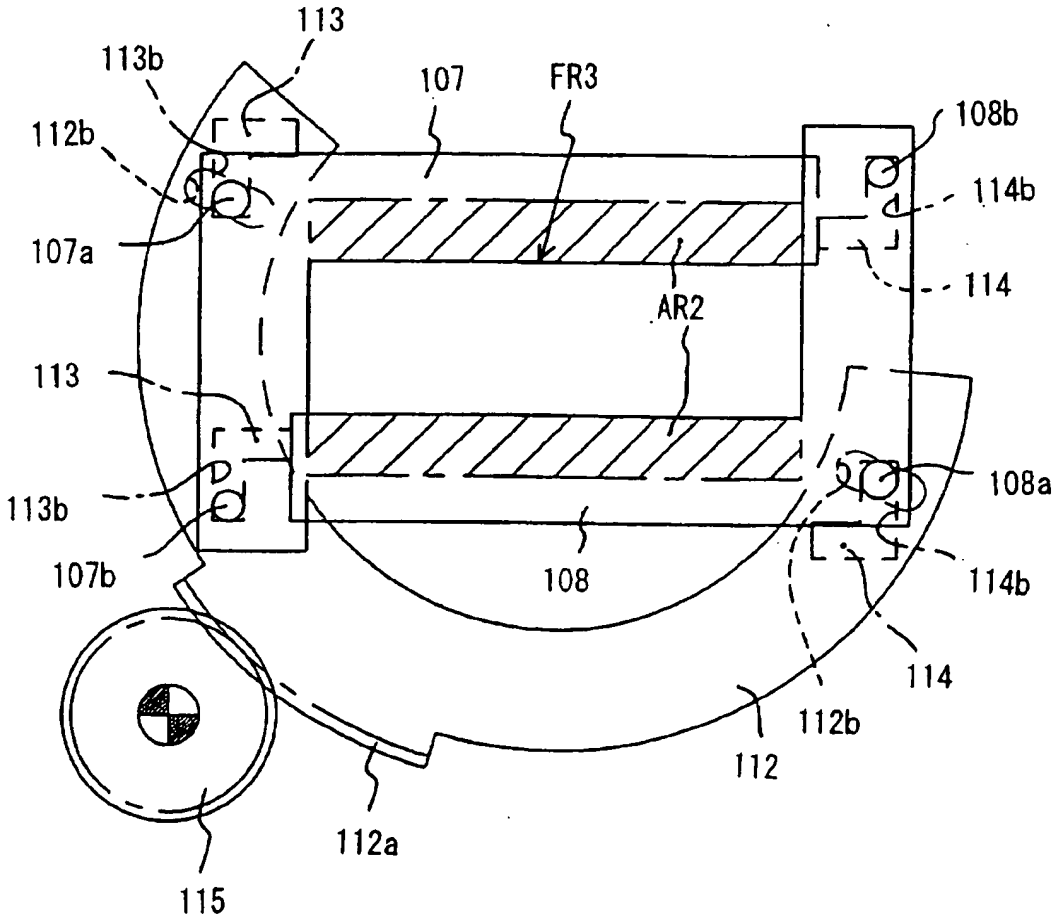

113
113b
107
FR3
108b
112b
114b
107a
114
AR2
113
108a
113b
107b
108
114b
114
112b
112
112a
115

FIG. 10A

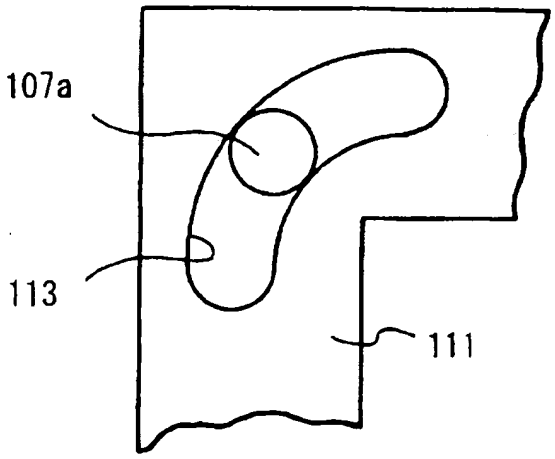


FIG. 10B

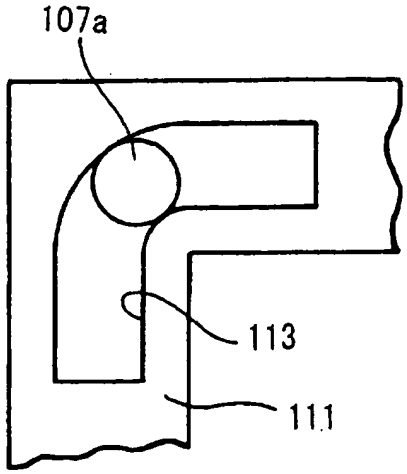


FIG. 11

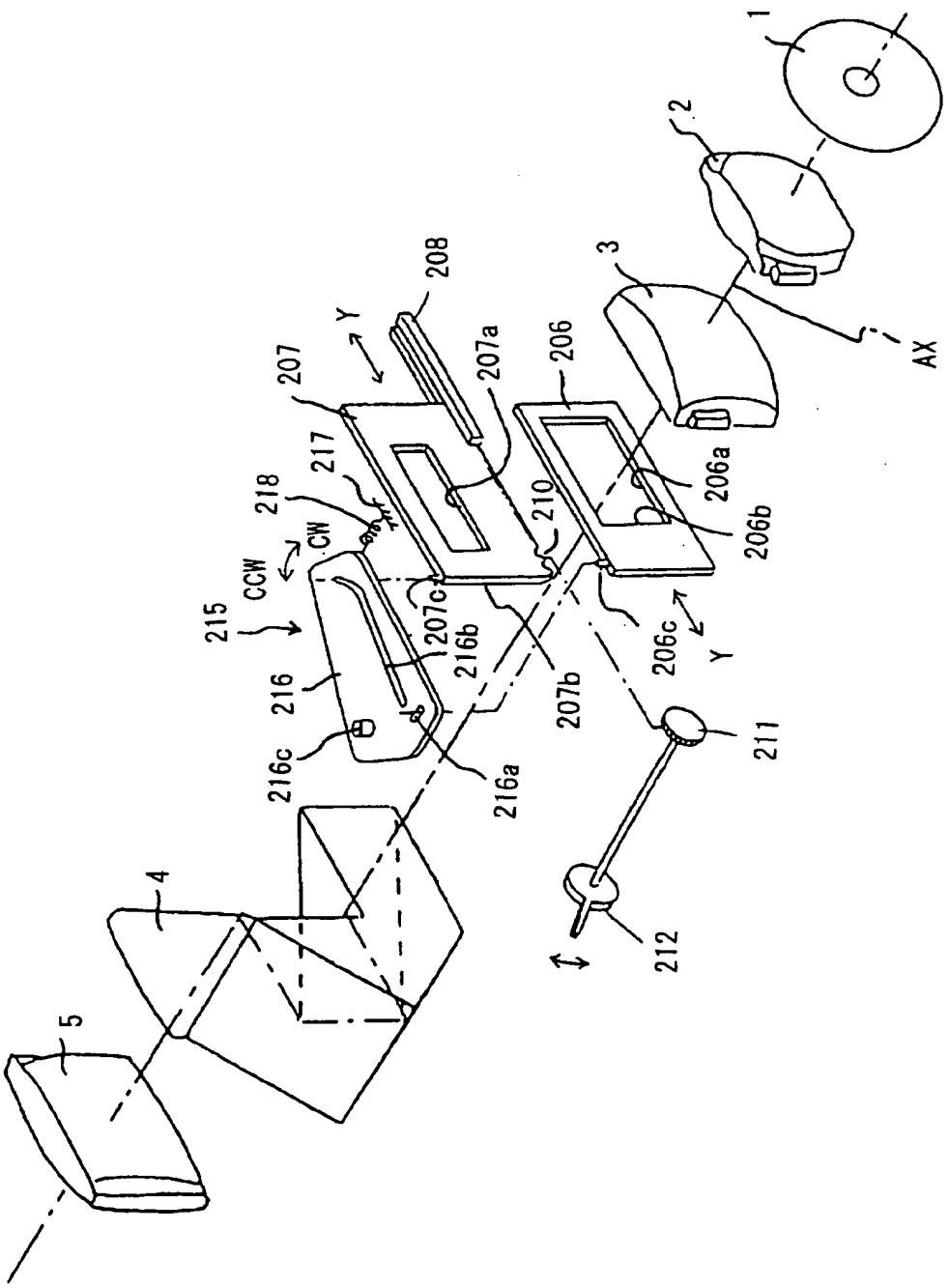

1
2
3
AX
208
207
Y
207a
206
217
218
CW
CCW
215
216
216c
216a
216b
207c
210
206a
206b
206c
207b
211
212
4
5

FIG. 12A

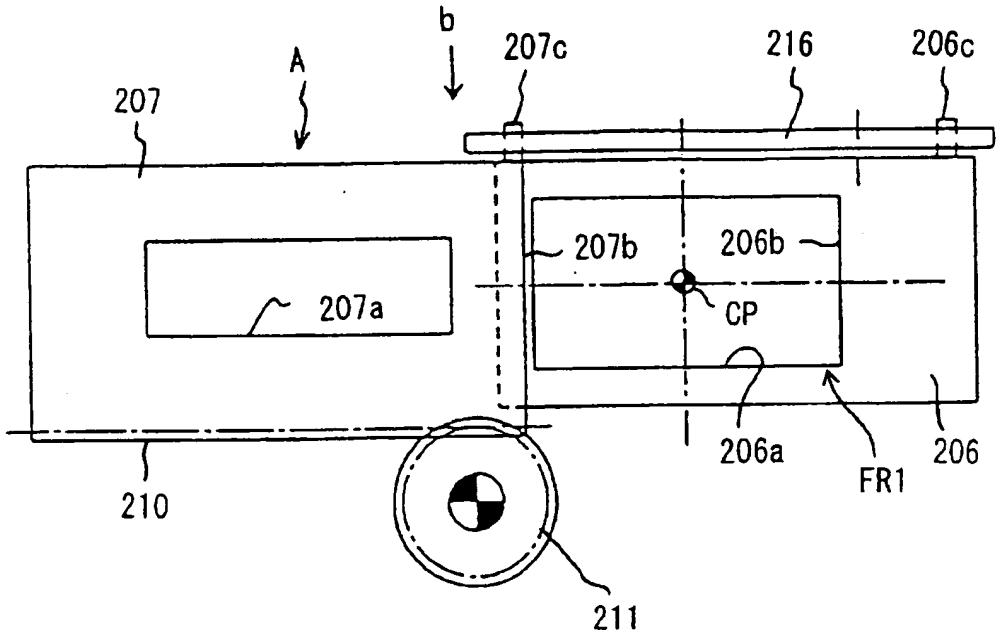


FIG. 12B

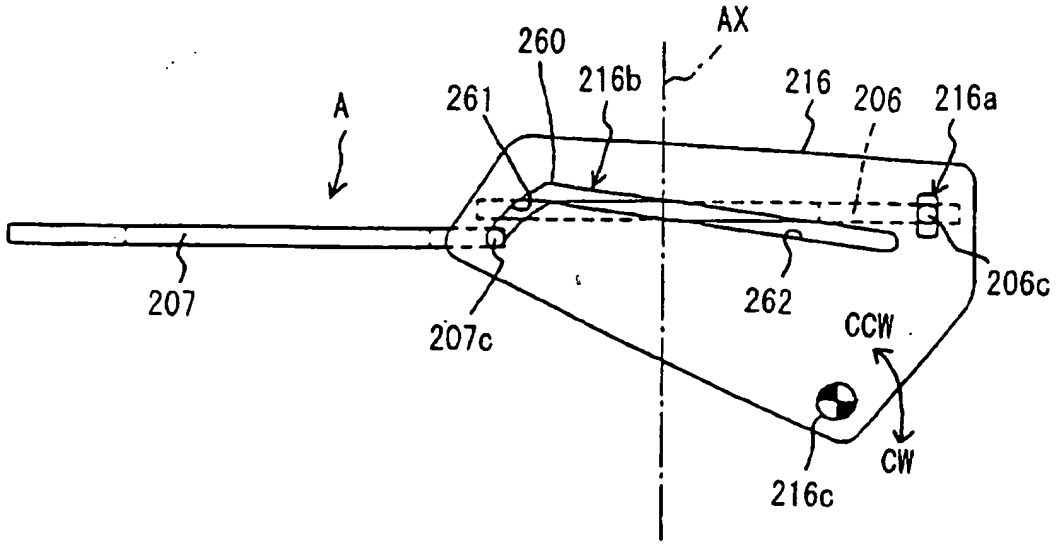


FIG. 13A

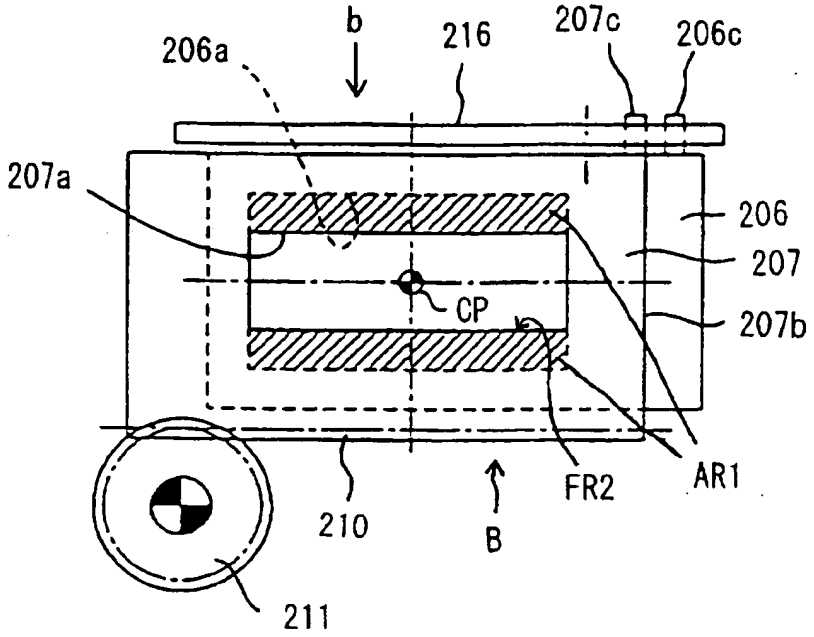


FIG. 13B

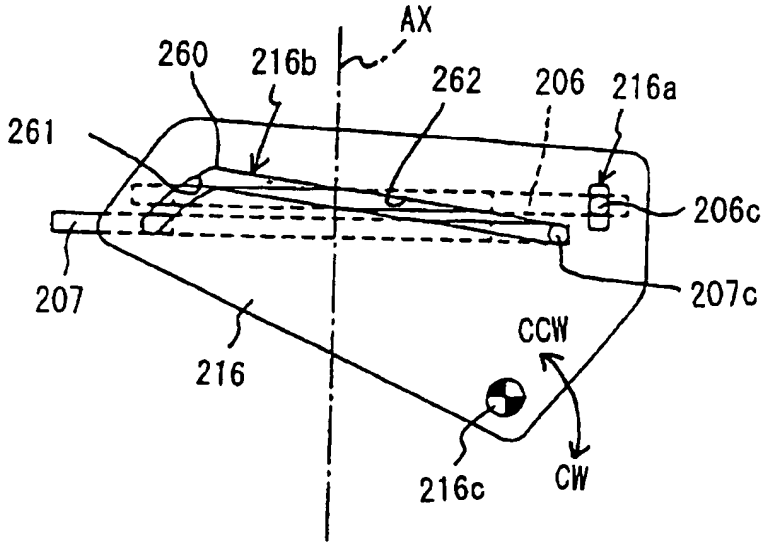


FIG. 14A

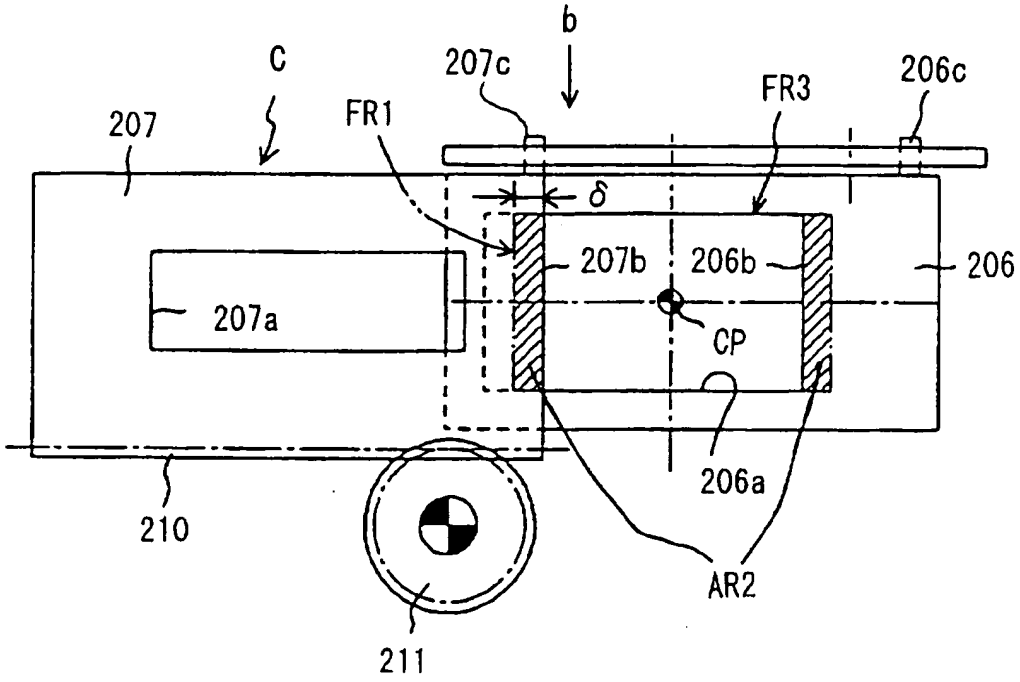


FIG. 14B

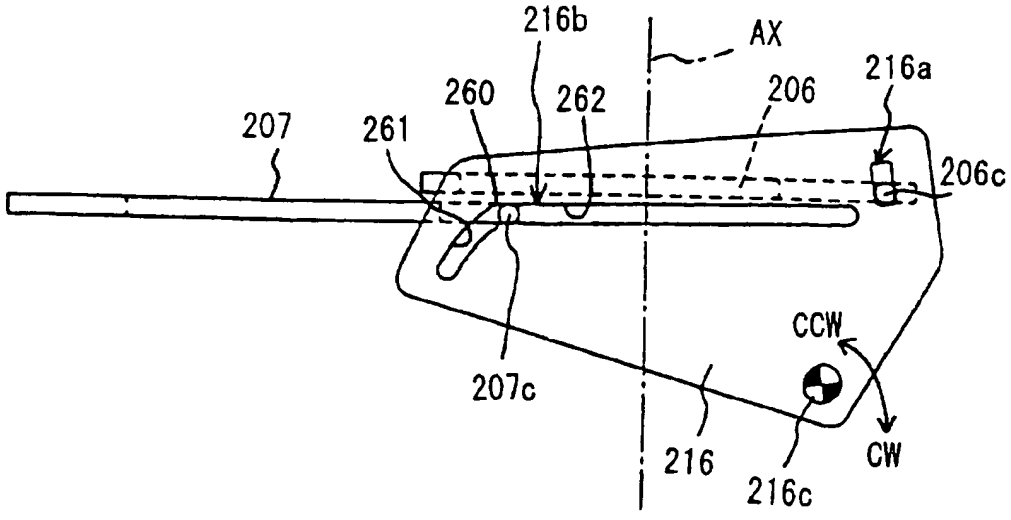


FIG. 15

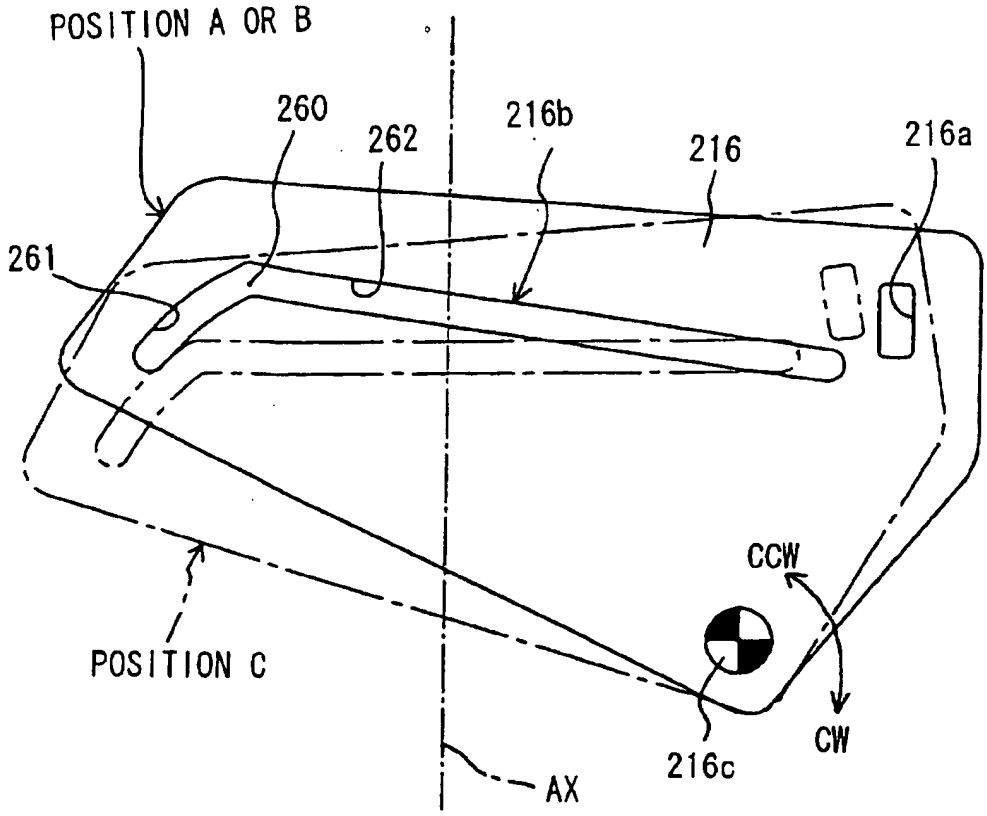

POSITION A OR B
260
262
216b
216
216a
261
CCW
CW
POSITION C
216c
AX

FIG. 16

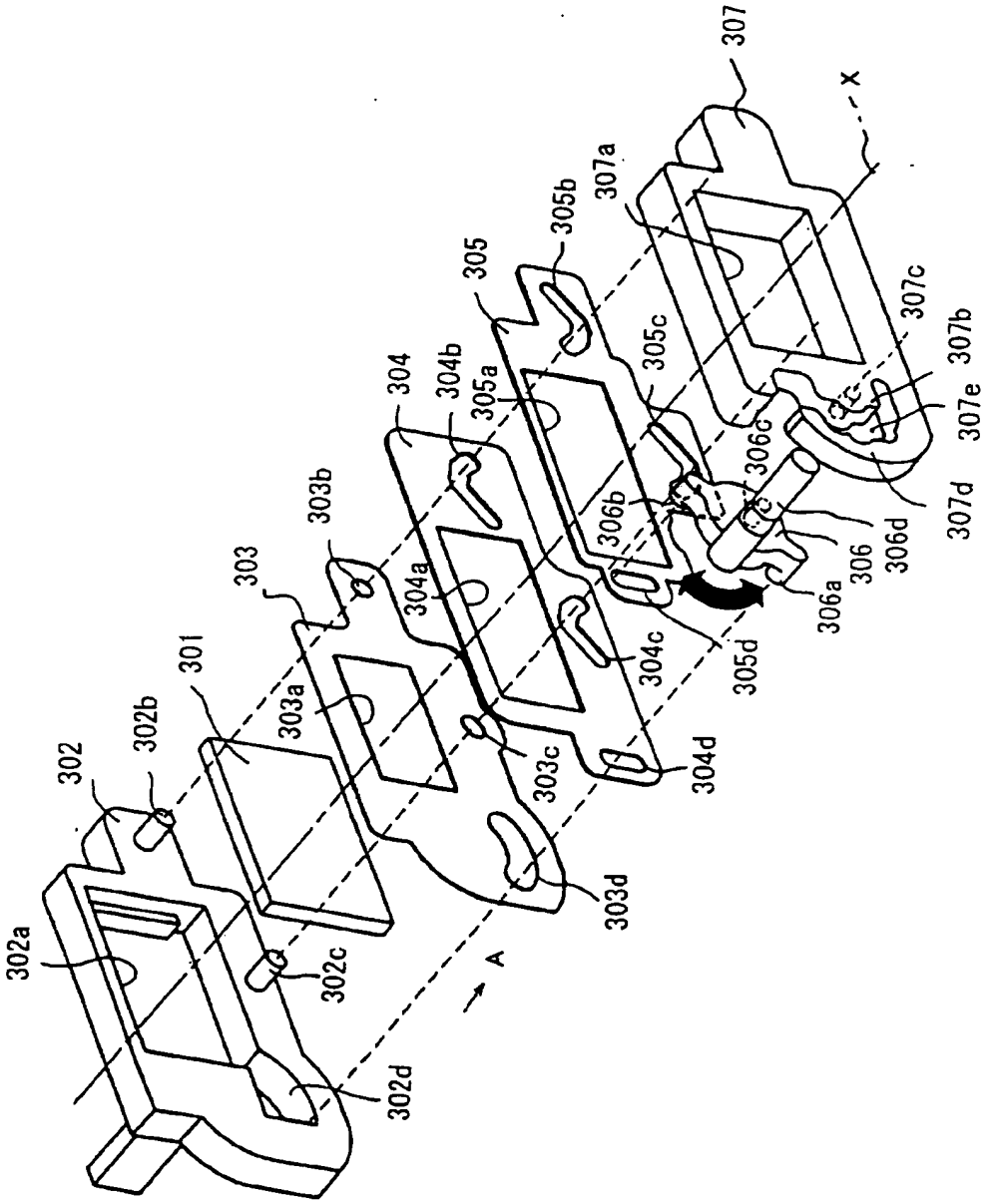

307
X
307a
305b
305
307c
307b
304
304b
305a
305c
307e
306c
303b
306b
307d
306
306d
303
304a
306a
304c
305d
301
303a
302b
302
303c
304d
303d
A
302a
302c
302d

FIG. 17

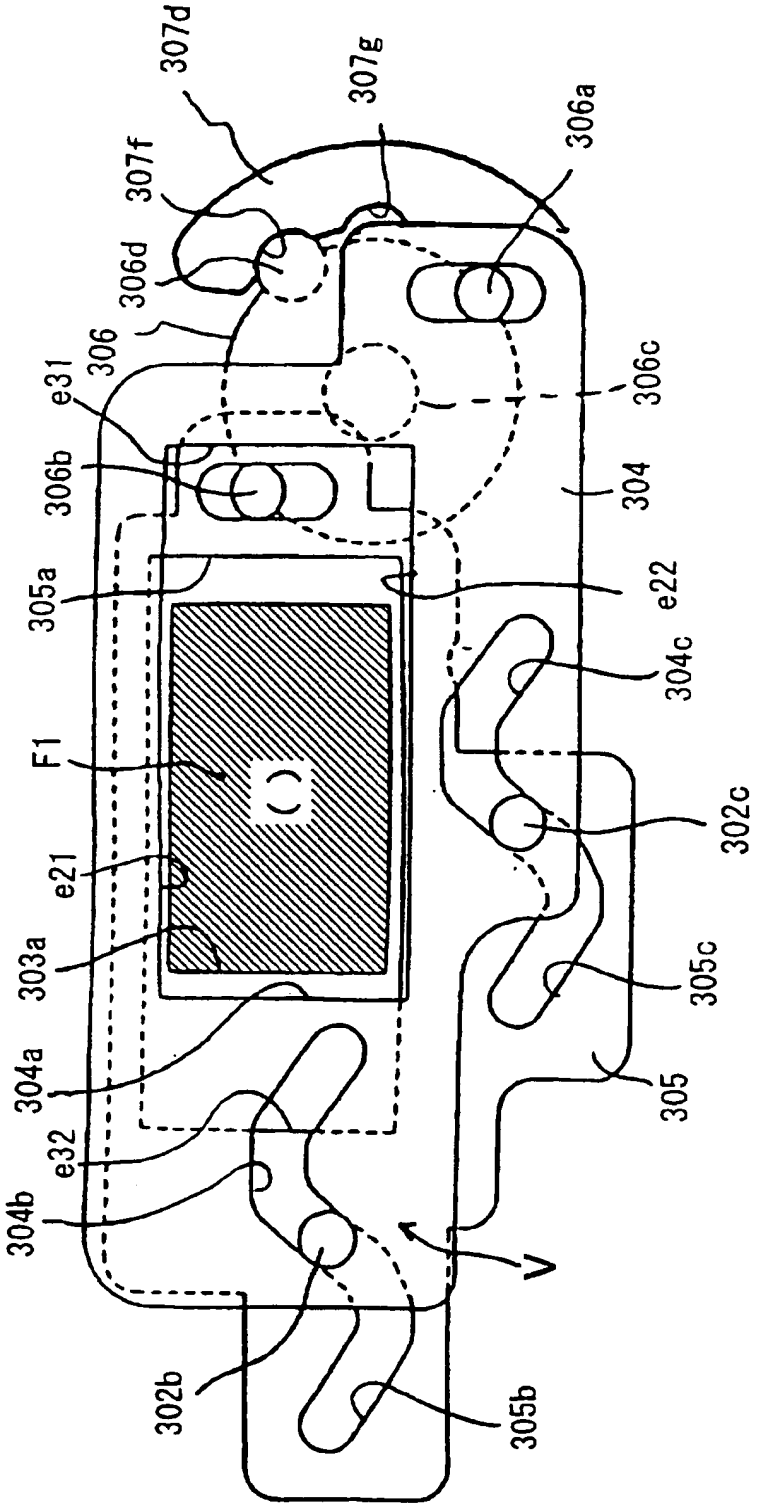

307d
307g
306a
307f
306d
306
e31
306c
306b
304
305a
e22
304c
F1
302c
e21
303a
305c
304a
305
e32
304b
302b
305b

FIG. 18

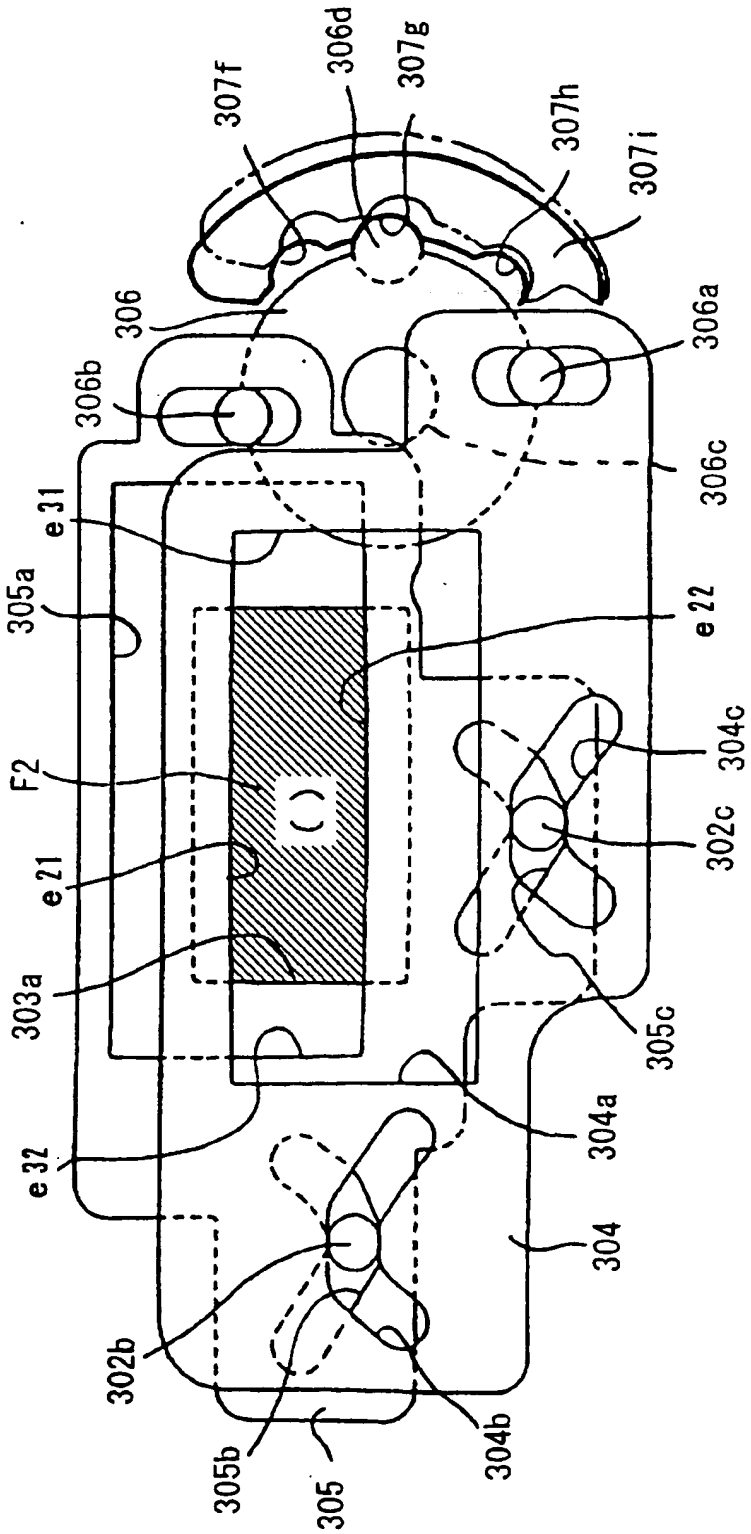

307f
306d
307g
307h
307i
306
306a
306b
306c
e31
305a
e22
F2
304c
e21
302c
303a
305c
e32
304a
304
302b
305b
305
304b

FIG. 19

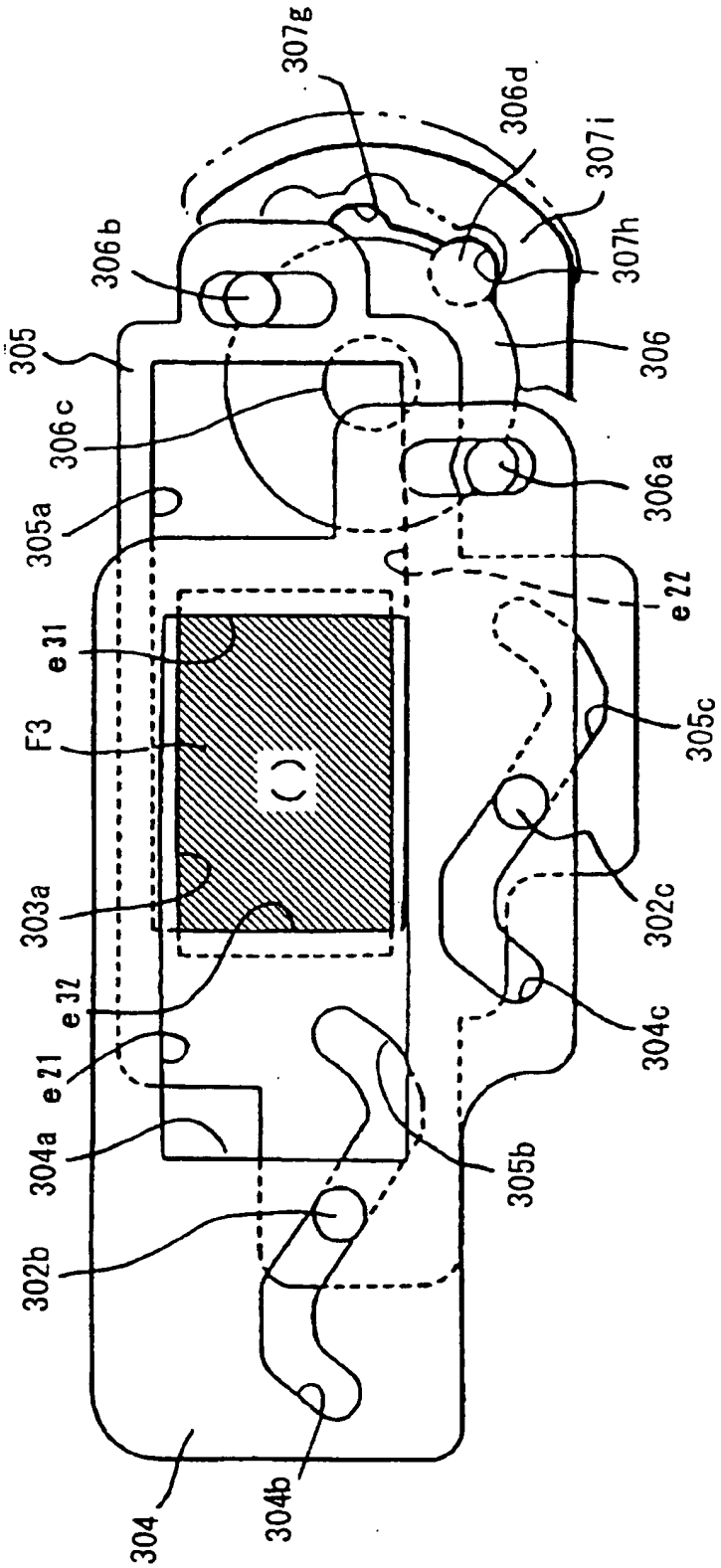

307g
306d
307i
306b
307h
305
306
306c
306a
305a
e22
e31
F3
305c
303a
302c
e32
304c
e21
304a
305b
302b
304
304b

FIG. 20

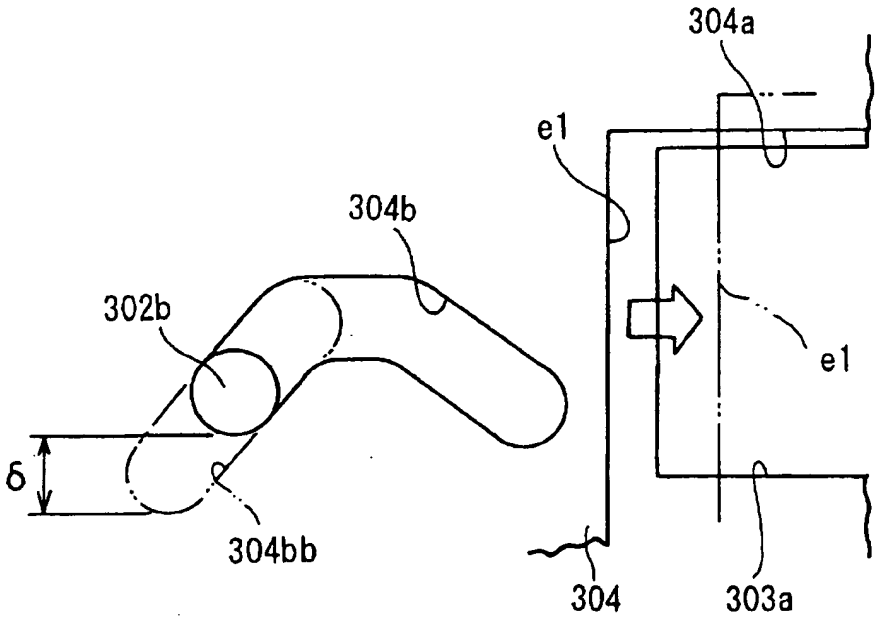


FIG. 21A

PRIOR ART

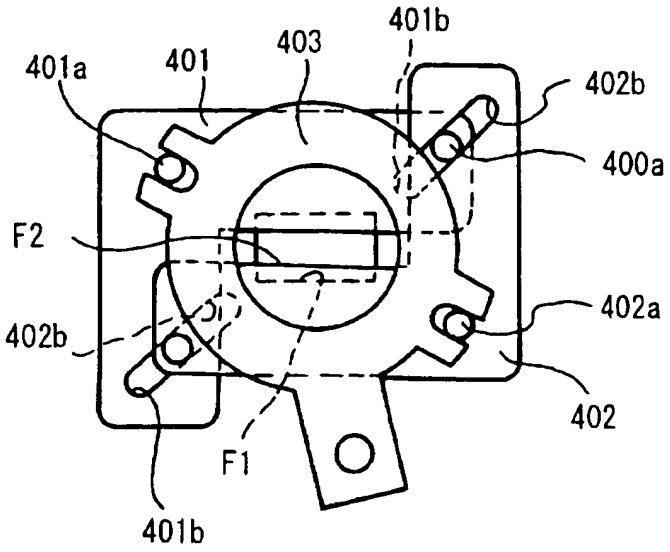


FIG. 21B

PRIOR ART

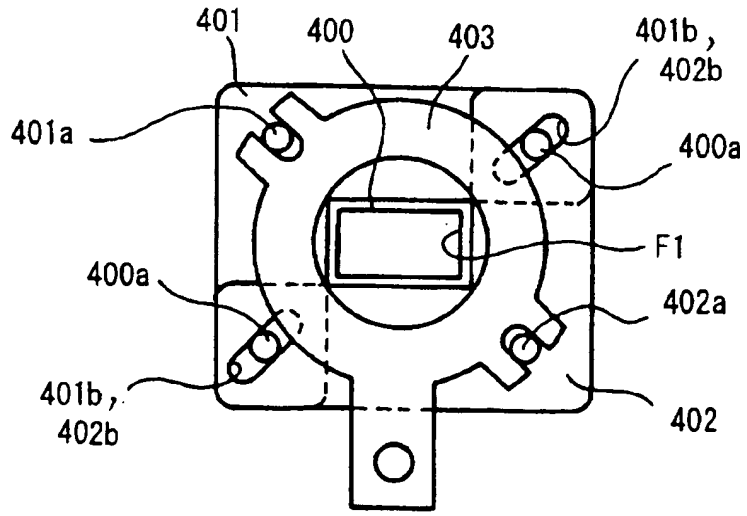


FIG. 21C

PRIOR ART

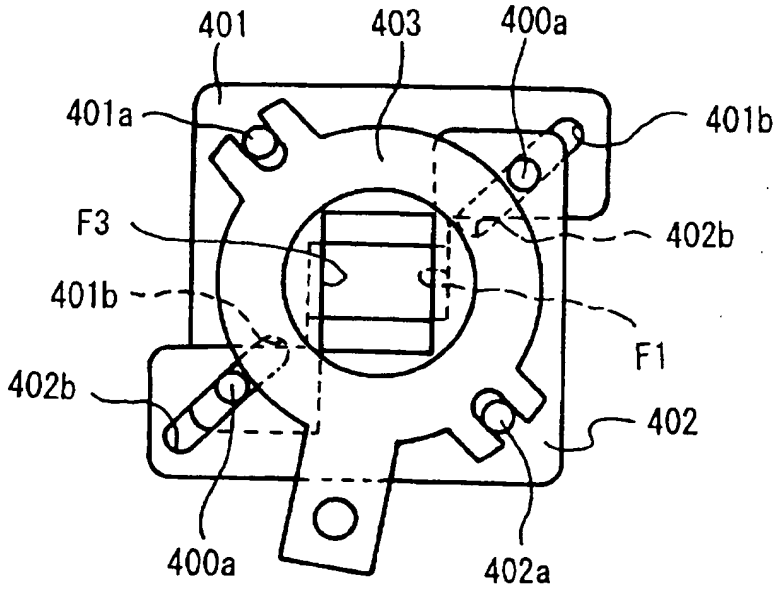


FIG. 22

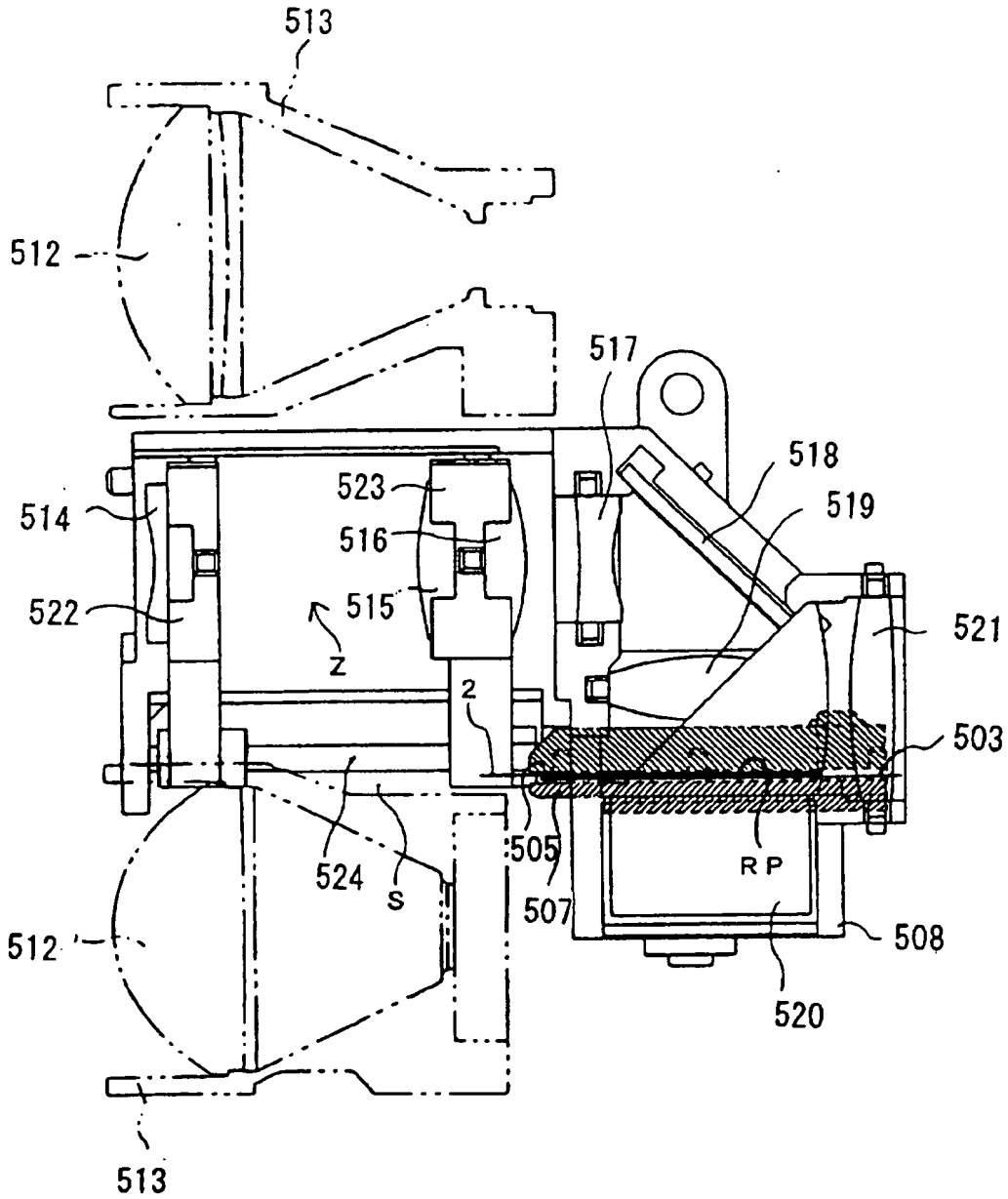

513
512
517
518
519
523
516
514
515
522
521
Z
2
503
505
524
S
507
RP
508
512
520
513

FIG. 23

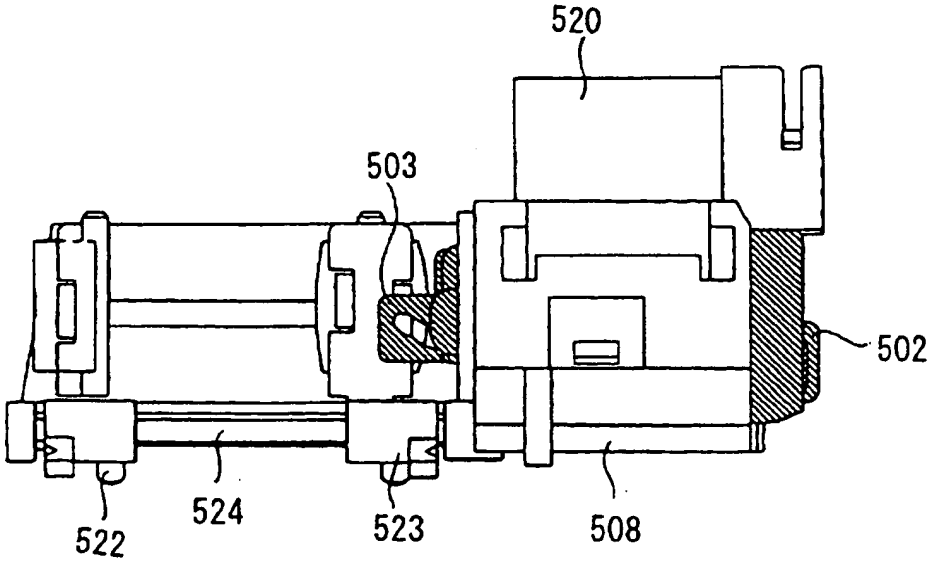


FIG. 24

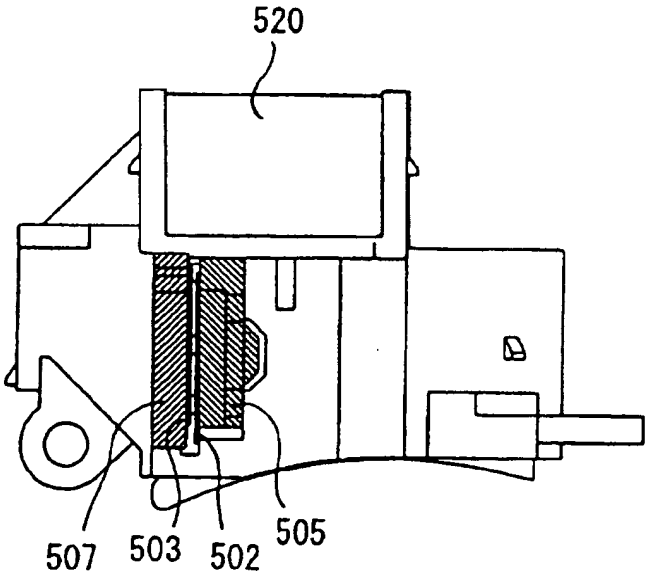


FIG. 25

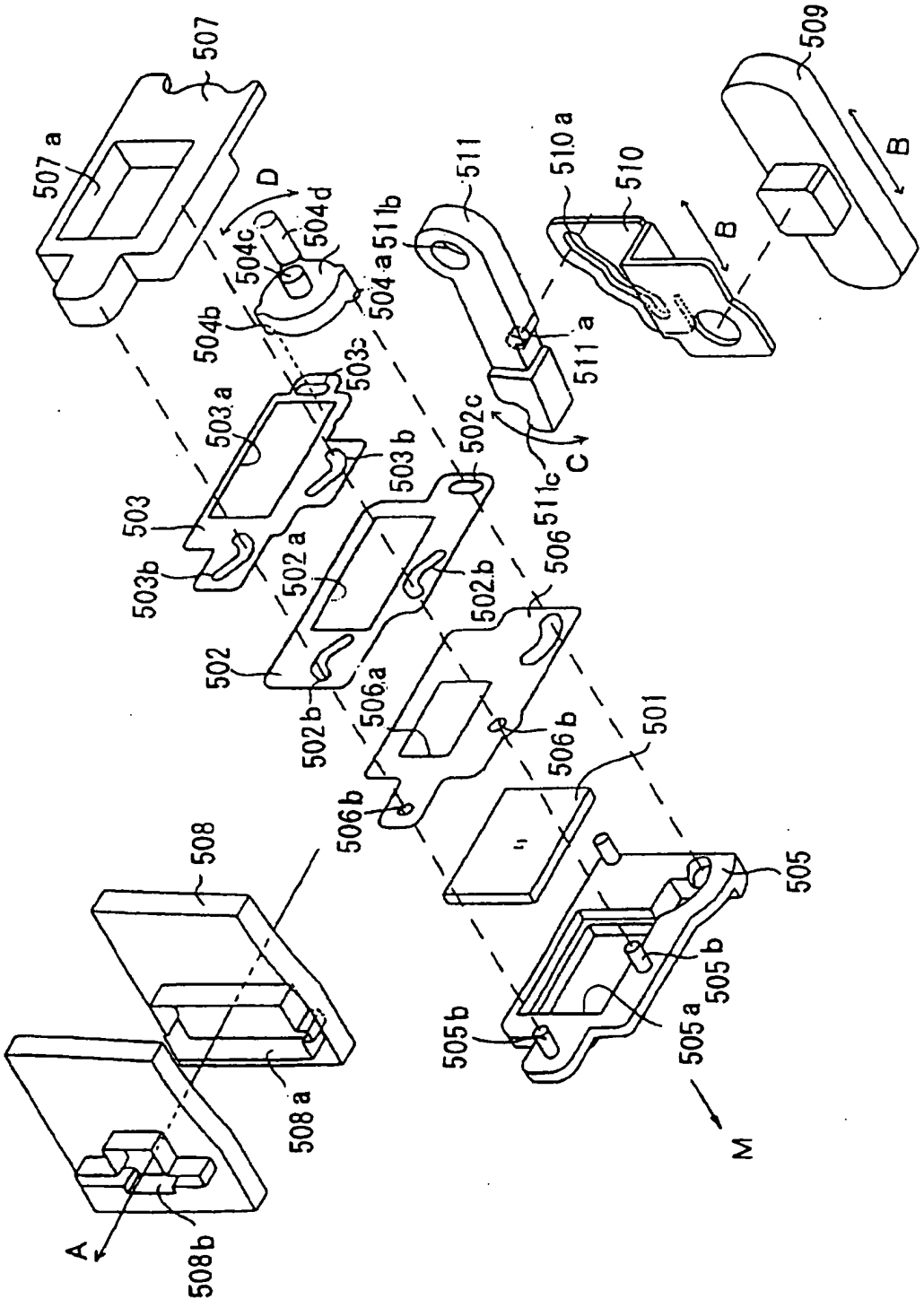

507
507a
D
504c
504d
504b
504a
503c
503a
503b
503
502a
502
502b
511b
511
510a
510
B
509
511a
502c
C
511c
503b
506
502b
506a
506b
501
505
505b
505a
M
508
508a
508b
A

FIG. 26

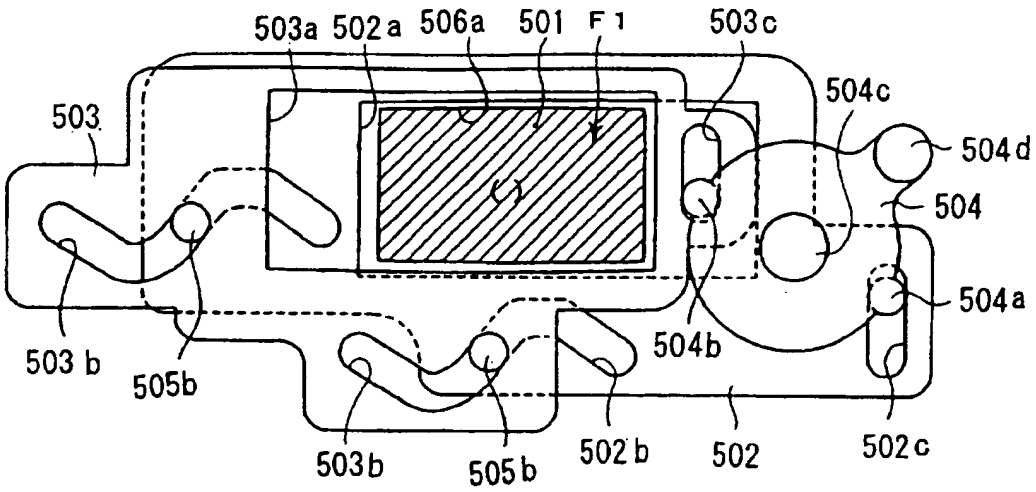

503a
502a
506a
501
F1
503c
504c
503
504d
504
504a
503b
505b
504b
503b
505b
502b
502
502c

FIG. 27

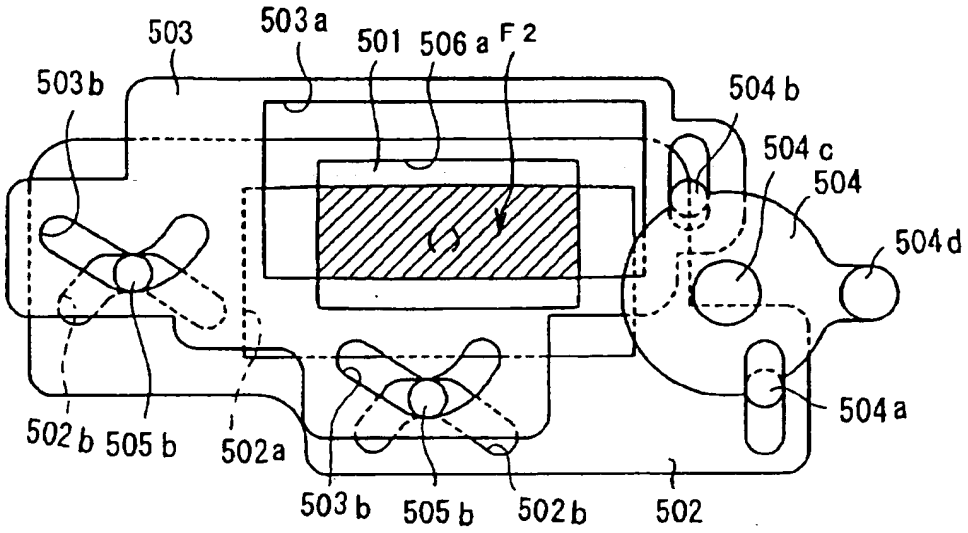

503
503a
501
506a
F2
503b
504b
504c
504
504d
504a
502b
505b
502a
503b
505b
502b
502

FIG. 28

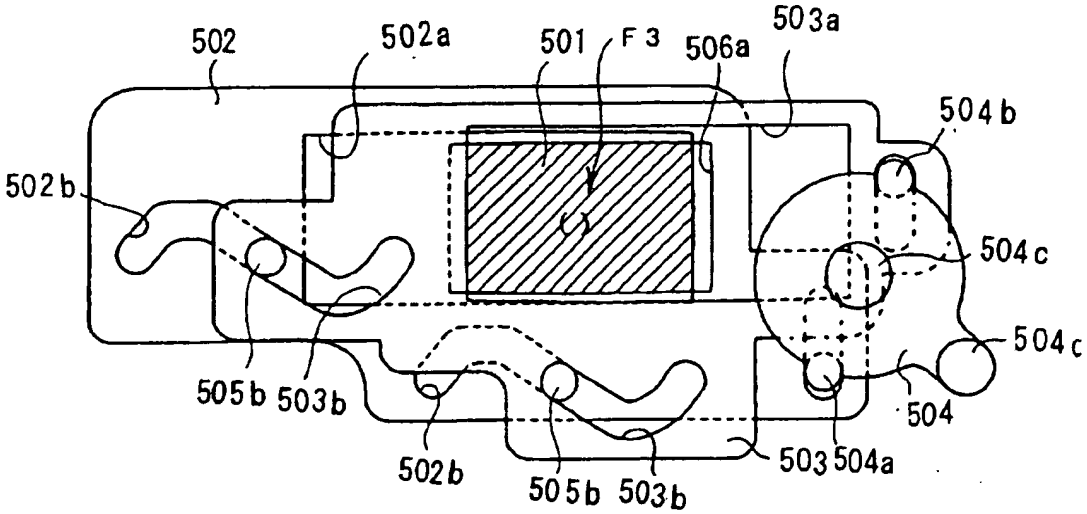

502
502a
501
F3
506a
503a
504b
502b
504c
504c
505b
503b
504
502b
503
504a
505b
503b

FIG.29

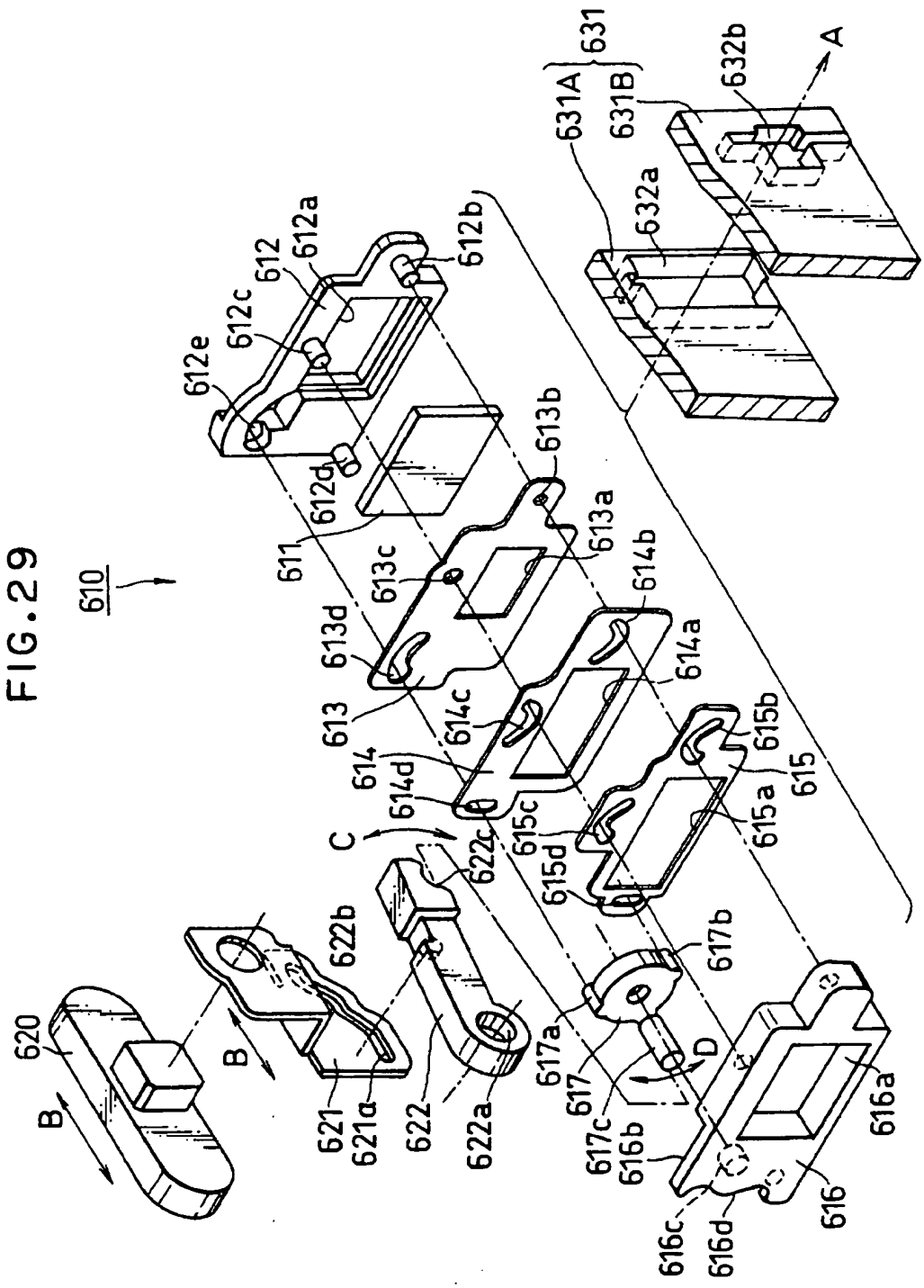

610
611
612
612a
612b
612c
612d
612e
613
613a
613b
613c
613d
614
614a
614b
614c
614d
615
615a
615b
615c
615d
616
616a
616b
616c
616d
617
617a
617b
617c
620
621
621a
622
622a
622b
622c
631
631A
631B
632a
632b
A
B
C
D

FIG.30

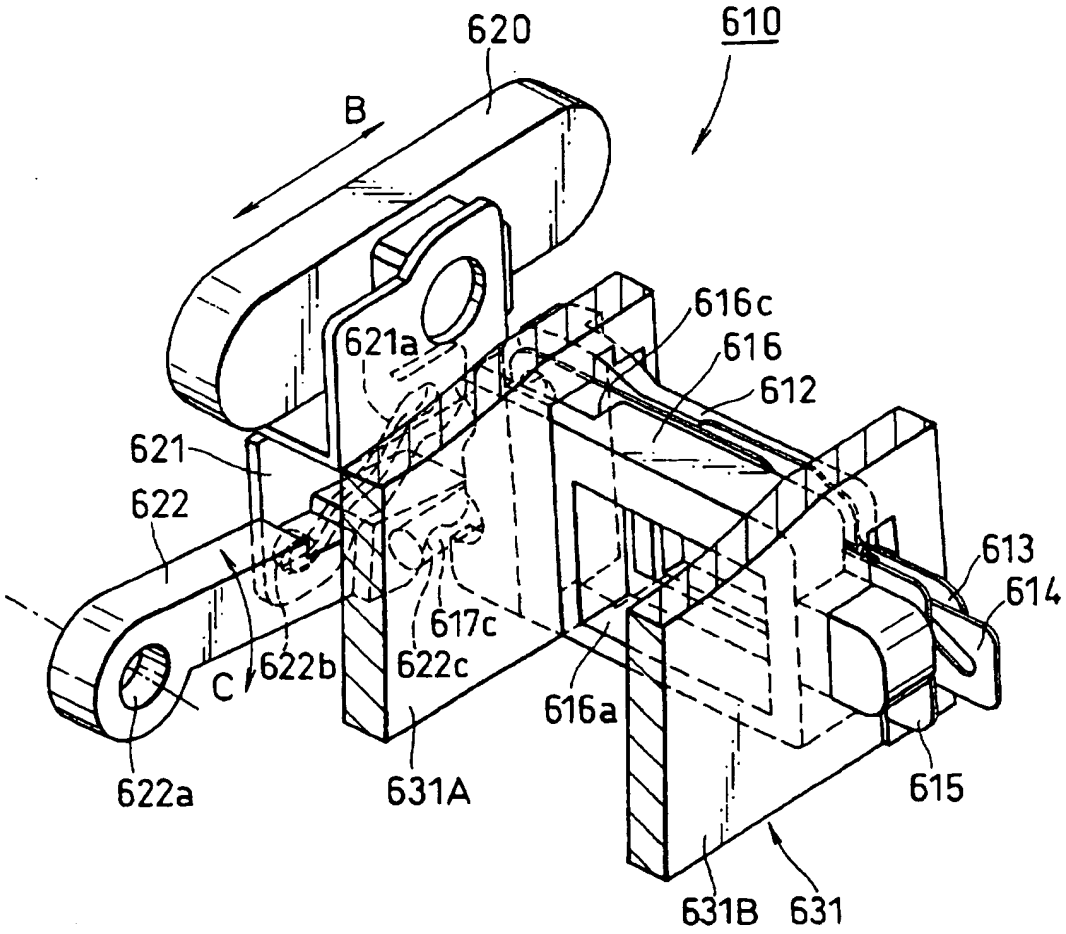

620
610
B
616c
621a
616
612
621
622
613
614
617c
C
622b
622c
616a
622a
631A
615
631B
631

FIG.31A

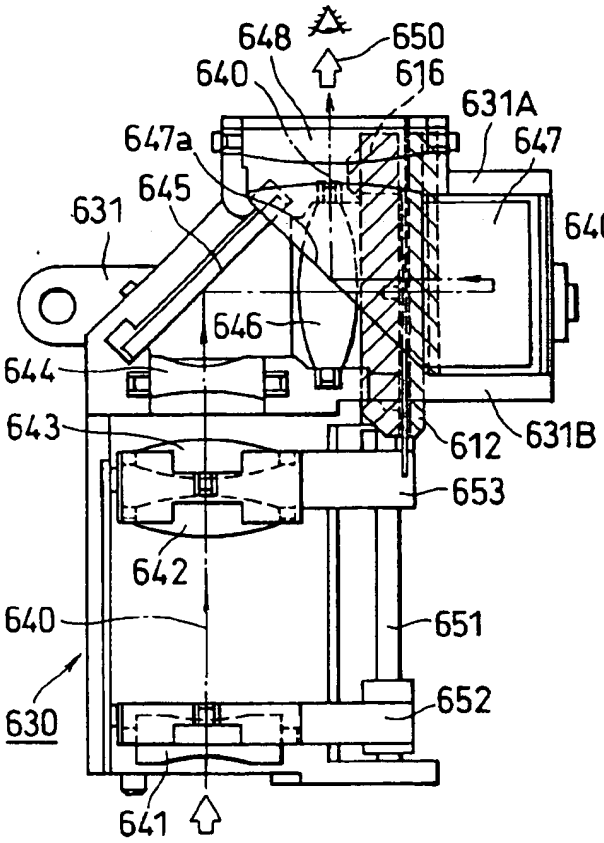


FIG.31B

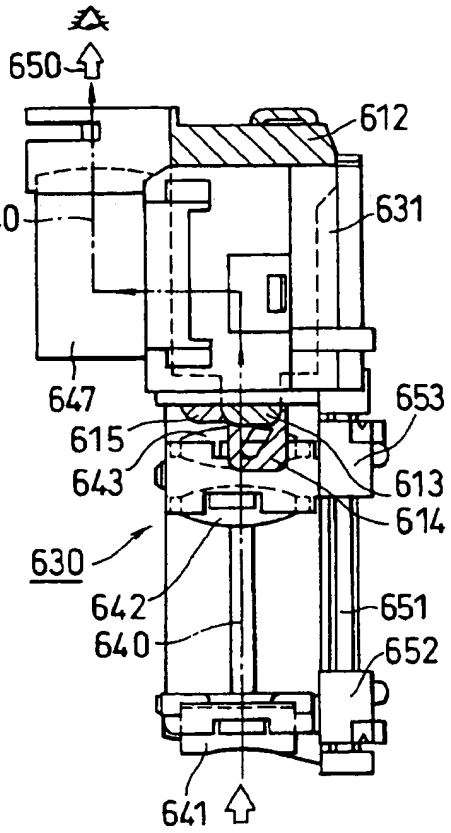
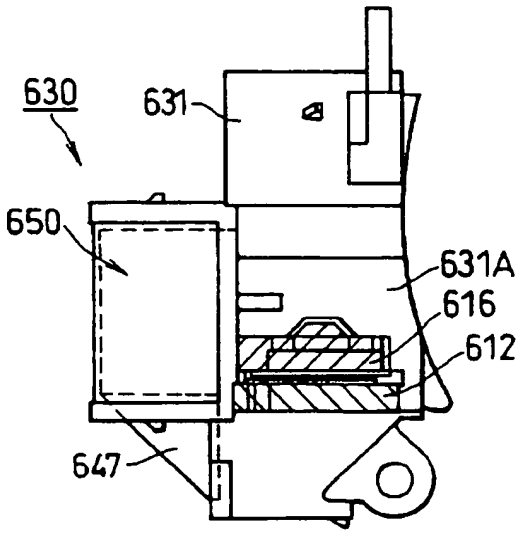


FIG.31C



PICTURE FRAME SWITCHING MECHANISM

This is a Continuation-in-Part of application Ser. No. 08/569,906, filed Dec. 8, 1995, now abandoned.

BACKGROUND OF THE INVENTION

1. Field of the Invention

The present invention relates to a mechanism for switching over a picture frame of an optical device, such as the field of view frame of the viewfinder of a camera or the like.

2. Description of the Related Art

As such a type of switching mechanism, there is disclosed, for example in Japanese Patent Laying-Open Publication Serial No. Heisei 4-113341, one in which a common pinion gear is interposed between a pair of racks for picture frame determination members, and this pinion gear is rotated so that the picture frame determination members are moved symmetrically with respect to the optical axis. Further, in Japanese Patent Laying-Open Publication Serial No. Heisei 6-82882 there is disclosed a mechanism in which, as shown in FIG. 21A, FIG. 21B, and FIG. 21C, a pair of L-shaped picture frame determination members are opposingly disposed along the diagonal direction of the viewfinder view and are engaged with a common cam plate, and these picture frame determination members are driven in mutually opposite diagonal directions according to the direction of operation of the cam plate.

In the construction of these FIGS. 21A through 21C, upon a picture frame mask **400** which determines a first picture frame F1 which is rectangular, there are superimposed in order in the direction of the optical axis of the viewfinder (the direction perpendicular to the plane of the drawing paper) a pair of L-shaped picture frame determination members **401** and **402** which are symmetrical with respect to the optical axis of the viewfinder, and a drive wheel **403**. The drive wheel **403** is engaged with pins **401***a* and **402***a* of the picture frame determination members **401** and **402** respectively, and pins **400***a* of the picture frame mask **400** are passed through long holes **401***b* and **402***b* of the picture frame determination members **401** and **402**. When the drive wheel **403** is rotated, the picture frame determination members **401** and **402** move along the long directions of the long holes **401***b* and **402***b*, and the first picture frame F1 is trimmed down by the picture frame determination members **401** and **402**. FIG. 21A shows the state in which the first picture frame F1 is trimmed down along its short sides so as to determine a second picture frame F2, while FIG. 21C shows the state in which the first picture frame F1 is trimmed down along its long sides so as to determine a third picture frame F3. Further, FIG. 21B shows the state in which both of the picture frame determination members **401** and **402** have been brought so as to avoid the first picture frame F1.

Since in the two types of prior art mechanism described above all of the picture frame determination members are directly moved by a common driving member (the pinion gear or the cam plate), therefore little freedom is available in the design with regard to the correspondence relation between the drive directions of the picture frame determination members and change of the picture frame, whereby change of the picture frame is restricted. That is to say, when the picture frame determination members are driven in the diagonal direction of the picture frame, the picture frame only expands and contracts vertically and horizontally at a fixed change ratio in correspondence to the slope of this direction of movement, and when the types of picture frame have been increased a requirement arises to provide picture frame determination members and their drive means individually in accordance with the type of the picture frame, and this makes the mechanism more complicated.

Further, with the prior art mechanism shown in FIG. 21A through FIG. 21C, when the picture frame determination members **401** and **402** are moved between the three positions which respectively correspond to the three picture frames F1 through F3, the first picture frame F1 is obtained by the second (middle) in the order of the guiding of the picture frame determination members **401** and **402** by the pins **400***a* and the long holes **401***b* and **402***b*. For this reason, when switching over between the second picture frame F2 and the third picture frame F3, the picture frame determination members **401** and **402** are required to pass through their positions which correspond to the first picture frame F1. When switching over between the second picture frame F2 and the third picture frame F3, the picture frame determination members **401** and **402** must either encroach into beyond the long sides or beyond the short sides of the first picture frame F1, while avoiding the others of these long sides and short sides; but with the above described arrangement, at the en route stage (the FIG. 21B stage) at which the first picture frame F1 is obtained, the picture frame determination members **401** and **402** have already been brought sufficiently thus to avoid, and by the subsequent avoiding motion the picture frame determination members **401** and **402** are removed from the first picture frame F1 more than is necessary. Accordingly, the space required for disposition of this picture frame switching mechanism is unnecessarily expanded in the upwards, downwards, leftwards, and rightwards directions of the picture frames F1 through F3, and this becomes a point which renders it more difficult to make the camera compact.

Further, with the picture frame switching mechanism of FIG. 21A through FIG. 21C, the center of rotation of the drive wheel **403** is positioned within the first picture frame F1. For this reason, a large drive wheel **403** becomes necessary in order to surround the first picture frame F1 around its four sides, which makes the mechanism larger in size. Further, since it is not possible to support the drive wheel **403** at the position of its center of rotation, there is also a danger that smooth operation of the drive wheel **403** cannot be guaranteed because its stability is poor.

SUMMARY OF THE INVENTION

The objective of the present invention is to propose a picture frame switching mechanism which can cope with many types of picture frame easily and in a compact manner.

In order to attain this objective, the picture frame switching mechanism of the present invention comprises: a plurality of picture frame definition members whose relative position in a plane perpendicular to an optical axis of an optical system is changed so as to switch picture frames; a drive section which drives a portion of the plurality of picture frame definition members; and a linked driving section which drives other portion of the picture frame definition members in linkage according to predetermined conditions with driving of the portion of the picture frame definition members.

Further, another picture frame switching mechanism of the present invention comprises: a pair of L-shaped picture frame definition members which are opposingly disposed along the diagonal direction of a rectangular shaped picture frame; and a guide member which guides the picture frame definition members so as to change the picture frame over

between a plurality of types by displacing the picture frame definition members in mutually opposite directions in a plane parallel to the picture frame, and by changing the directions of displacement of the pair of picture frame definition members en route of their respective displacements.

Further, another picture frame switching mechanism of the present invention comprises: a first picture frame definition member which defines a rectangular shaped first picture frame; and a second picture frame definition member which is provided so as to be shiftable between an encroaching position in which the second picture frame definition member encroaches into the first picture frame by being superimposed in a direction of an optical axis upon the first picture frame definition member and a withdrawn position in which the second picture frame definition member is withdrawn outside from one side of the first picture frame, and in the encroaching position defines a second picture frame by narrowing down the first picture frame in a first direction parallel to the one side, and when shifted to a central stopping position between the encroaching position and the withdrawn position defines a third picture frame along with the first picture frame definition member by narrowing down the first picture frame in a second direction which is perpendicular to the first direction.

Further, another picture frame switching mechanism of the present invention comprises: a picture frame switching member which is inserted into an optical path of an optical system; and a guide mechanism which guides the picture frame switching member according to a predetermined guiding order between a first position corresponding to a first picture frame which is of rectangular shape, a second position corresponding to a second picture frame which is squeezed in a direction following along short sides of the first picture frame, and a third position corresponding to a third picture frame which is squeezed in a direction following along long sides of the first picture frame, and which performs switching between the second position and the third position not via the first position.

Further, another picture frame switching mechanism of the present invention comprises: a picture frame switching member which is inserted into an optical path of an optical system and which switches between a plurality of picture frames; a drive member which, in a state of being engaged with the picture frame switchover member, is rotationally operated around a rotational axis which is set outside the picture frame and parallel to a direction of an optical axis of the optical system; and a guide mechanism which shifts the picture frame switching member between a plurality of positions respectively corresponding to the plurality of picture frames in linking with a rotation of the drive member.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. **1** is a perspective diagram showing an overall structural view of a viewfinder optical system according to the first embodiment of the present invention;

FIG. **2** is a figure showing the state in which a first picture frame is determined in the first embodiment;

FIG. **3** is a figure showing the state in which a second picture frame is determined in the first embodiment;

FIG. **4** is a figure showing the state in which a third picture frame is determined in the first embodiment;

FIG. **5** is a figure showing a variant embodiment from FIG. **1**;

FIG. **6** is a perspective diagram showing an overall structural view of a viewfinder optical system according to the second embodiment of the present invention;

FIG. **7** is a figure showing the state in which a first picture frame is determined in the second embodiment;

FIG. **8** is a figure showing the state in which a second picture frame is determined in the second embodiment;

FIG. **9** is a figure showing the state in which a third picture frame is determined in the second embodiment;

FIG. **10A** is a view showing a variant example of a guide slot of the second embodiment;

FIG. **10B** is a view showing a variant example of a guide slot of the second embodiment;

FIG. **11** is a perspective diagram showing an overall structural view of a viewfinder optical system according to the third embodiment of the present invention;

FIG. **12A** is a view showing the state in which a first picture frame is determined in the third embodiment, as seen from the side of a prism;

FIG. **12B** is a plan view of FIG. **12A** as seen from the direction "b";

FIG. **13A** is a view showing the state in which a second picture frame is determined in the third embodiment, as seen from the side of a prism;

FIG. **13B** is a plan view of FIG. **13A** as seen from the direction "b";

FIG. **14A** is a view showing the state in which a third picture frame is determined in the third embodiment, as seen from the side of a prism;

FIG. **14B** is a plan view of FIG. **14A** as seen from the direction "b";

FIG. **15** is a view showing the positional correspondence between a second picture frame determination member and a cam plate, in the third embodiment;

FIG. **16** is an exploded perspective diagram showing a picture frame switching mechanism according to the fourth embodiment of the present invention, with its surroundings;

FIG. **17** is a figure showing the state in which a first picture frame is determined in the fourth embodiment;.

FIG. **18** is a figure showing the state in which a second picture frame is determined in the fourth embodiment;

FIG. **19** is a figure showing the state in which a third picture frame is determined in the fourth embodiment;

FIG. **20** is a view showing a V portion of FIG. **17** as compared with an example of the prior art;

FIG. **21A** is a figure showing an example of the prior art;

FIG. **21B** is a figure showing an example of the prior art; and:

FIG. **21C** is a figure showing an example of the prior art.

FIG. **22** is a plan view of a viewfinder of a camera according to a fifth embodiment of the present invention, and of its vicinity;

FIG. **23** is an elevation view of the camera according to the fifth embodiment of the present invention, and of its vicinity;

FIG. **24** is a view from the right side of the camera according to the fifth embodiment of the present invention, and of its vicinity;

FIG. **25** is an exploded perspective view of a visual field switching mechanism included in the viewfinder of FIGS. **22** through **24** as seen slantingly from below;

FIG. **26** is a view showing the condition in which a reference first visual field is specified by the visual field switching mechanism of FIG. **25**;

FIG. **27** is a view showing the condition in which a second visual field is specified by covering the long sides of the first visual field of FIG. **26**;

FIG. 28 is a view showing the condition in which a third visual field is specified by covering the short sides of the first visual field of FIG. 26;

FIG. 29 is an exploded perspective view of a picture frame switching mechanism of a viewfinder according to a sixth embodiment of the present invention as seen slantingly from below;

FIG. 30 is a perspective view of the picture frame switching mechanism of the viewfinder of FIG. 29 shown in the assembled state as seen slantingly from below;

FIG. 31A is a sectional view of the case when the picture frame switching mechanism is used in a real image type viewfinder as seen from a direction in the horizontal plane;

FIG. 31B is a side view of the case when the picture frame switching mechanism is used in a real image type viewfinder; and:

FIG. 31C is a rear view of the case when the picture frame switching mechanism is used in a real image type viewfinder.

DESCRIPTION OF THE PREFERRED EMBODIMENT(S)

The embodiments which will be explained hereinafter are picture frame switching mechanisms for a viewfinder optical system which is provided as separate from an optical system for photography of a camera. With this camera, a signal can be recorded upon the recording medium such as a film or the like which indicates the format (the aspect ratio) for use when printing, and this format can be selected from a first format, a second format which is the first format compressed in the direction along its long sides, and a third format which is the first format compressed in the direction along its short sides. When printing, a region determined according to the format which has been recorded, from the image in the exposure region upon the film which is determined by the optical system for photography, is printed upon the photographic paper.

Further, it is also applicable to a picture frame switching mechanism of a viewfinder optical system of a camera which determines the exposure region of the photographic optical system according to a first format, a second format, or a third format, without recording any format signal.

Embodiment 1

The first embodiment of the present invention will now be explained with reference to FIGS. 1 through 4. FIG. 1 is a perspective diagram showing an overall structural view of a real image type viewfinder optical system of a camera, according to a first embodiment to which the present invention has been applied. 1 is a diaphragm. 2 and 3 are objective lenses. 4 is a prism which inverts the photographic subject image which the objective lenses 2 and 3 have captured top to bottom and left to right, and 5 is an eyepiece lens.

In order selectively to establish in the field of view of the above described eyepiece lens 5 three types of picture frame in correspondence to the selection of the above described three types of format, a single standard frame determination member 6 and four picture frame determination members 7, 8, 9, and 10 are disposed in the vicinity of the focus plane (the real image plane). The standard frame determination member 6 is one which is formed as a basically rectangular shaped opaque body 6*a* with an opening 6*b* whose aspect ratio agrees with the above described first format. On the other hand, since the picture frame determination members 7 through 10 are ones for restricting the picture frame determined by the opening 6*b* of the standard frame determination member 6 (hereinafter termed the "first picture frame") in the direction along its long sides (the direction shown by the arrow A) and in the direction along its short sides (the direction shown by the arrow B), it may be made of any light reducing material (for example ND filter with a transparency ratio of about 10%). Instead of a light reducing member, it is also acceptable to use opaque material in sheet form with a transparency ratio of 0%.

As shown in FIG. 2, the picture frame determination members 7 and 8, and the picture frame determination members 9 and 10, are respectively symmetrically disposed in relation to the center CP of the first picture frame FR1. Moreover, this center CP is upon the optical axis AX shown in FIG. 1 of the viewfinder. The left and right picture frame determination members 7 and 8 are supported by a support member not shown in the figure so as to be movable in the direction to approach from the short sides of the first picture frame FR1 towards the center CP or in the direction to move away therefrom, while the up and down picture frame determination members 9 and 10 are supported by a support member not shown in the figure so as to be movable in the direction to approach from the long sides of the first picture frame FR1 towards the center CP or in the direction to move away therefrom. The left and right picture frame determination members 7 and 8 are provided with arm portions 7*a* and 8*a* which extend towards the side of the first picture frame FR1, and racks 7*b* and 8*b* are formed upon the mutually confronting portions of these arms 7*a* and 8*a*. The racks 7*b* and 8*b* are engaged with a common pinion gear 11, and this pinion gear 11 is rotationally driven by a picture frame switchover lever 12 (FIG. 1). The picture frame switchover lever 12 may also be used as a selection lever for the above described format signal.

Cam faces 13 and 14 are formed upon the upper and lower rims of the picture frame determination member 7. The picture frame determination members 9 and 10 are always biased towards the center CP of the first picture frame FR1 by compression springs 16 and 17 which are provided between these picture frame determination members 9 and 10 and a fixed member 15 (for example the body of the camera). By these biasing forces, cam pins 18 and 19 which are embedded in the picture frame determination members 9 and 10 are pushed against the cam faces 13 and 14, and thereby the positions of the picture frame determination members 9 and 10 are determined. The cam faces 13 and 14 are formed so as to be symmetrical in the direction B which follows along the short sides of the first picture frame FR1, and have sloping faces 13*a* and 14*a* which are displaced towards the center of the picture frame determination member 7 going towards the first picture frame FR1, and flat faces 13*b*, 13*c*, 14*b*, and 14*c* which are provided as extending parallel to the direction of movement of the picture frame determination member 7 from both its ends.

With the above construction, when the picture frame switchover lever 12 is kept at the center of its range of movement, as shown in FIG. 2 the picture frame determination members 7 and 8 are kept away from the first picture frame FR1 to the left and right, and the cam pins 18 and 19 are positioned upon the flat faces 13*b* and 14*b* of the cam faces 13 and 14, so that the picture frame determination members 9 and 10 are kept away from the first picture frame FR1 to the top and bottom. The first picture frame FR1 which coincides with the opening 6*b* is displayed in the field of view of the eyepiece lens 5. When from the FIG. 2 position the picture frame switchover lever 12 is operated so as to rotate the pinion gear 11 in the clockwise direction, the

picture frame determination members 7 and 8 are advanced as shown in FIG. 3 so as to encroach within the first picture frame FR1, and light reducing regions (the hatched regions in the figure) AR1 are generated at the left and right ends of the first picture frame FR1, with a second picture frame FR2 being determined within them. Moreover, the relationship between the amount of operation of the picture frame switchover lever 12 and the amount of displacement of the picture frame determination members 7 and 8 is set so that the aspect ratio of this second picture frame FR2 agrees with the above described second format.

On the other hand, when from the FIG. 2 position the picture frame switchover lever 12 is operated so as to rotate the pinion gear 11 in the anticlockwise direction, the picture frame determination members 7 and 8 are further drawn back as shown in FIG. 4 from the first picture frame FR1, and the cam pins 18 and 19 move to the flat faces 13*c* and 14*c* via the sloping faces 13*a* and 14*a*. Due to this, the picture frame determination members 9 and 10 are advanced so as to encroach within the first picture frame FR1, and light reducing regions (the hatched regions in the figure) AR2 are generated at the top and bottom ends of the first picture frame FR1, with a third picture frame FR3 being determined within them. The short sides of the third picture frame FR3 are formed by the short sides of the opening 6*b*. The position of the flat faces 13*c* and 14*c* of the cam faces 13 and 14 is set so that the aspect ratio of this third picture frame FR3 agrees with the above described third format.

According to the above described first embodiment, it is possible to impart various movements to the picture frame determination members 9 and 10 just by changing the form of the cam faces 13 and 14 and without additionally changing the directions of movement or the amounts of displacement of the picture frame determination members 7 and 8, so that it is easily possible to cope with various picture frames.

Moreover, when the transparency ratio of the picture frame determination members 7 through 10 is suitably set, it is possible to check in the viewfinder picture, in the state shown in FIG. 3, both the first picture frame FR1 and the second picture frame FR2 at the same time, and, in the state shown in FIG. 4, both the first picture frame FR1 and the third picture frame FR3 at the same time. When this is not necessary, it is also acceptable to construct the picture frame determination members 7 through 10 from opaque material. As shown in FIG. 5, it is also acceptable to determine three or more picture frames only with the picture frame determination members 7 through 10, omitting the standard frame determination member 6. It is beneficial to arrange for it to be possible to fix the picture frame switchover lever 12 by a notch mechanism or the like in positions respectively corresponding to the first picture frame FR1, the second picture frame FR2, and the third picture frame FR3. With a camera constructed so that it is possible to change the size of an aperture which is directly in front of the exposure plane of the film, whereby it is also possible to vary the size itself of the photographic picture which is recorded upon the film in correspondence with the above described first through third picture frames, it is possible to link together the movements of the picture frame switchover lever 12 and the aperture.

It would also be acceptable to link together the first determination member and the second determination member by a link mechanism.

Embodiment 2

The second embodiment of the present invention will now be explained with reference to FIG. 6 through FIG. 9. FIG. 6 is a perspective diagram showing the overall structure of a real image type viewfinder optical system of a camera of the second embodiment to which the present invention is applied. To parts which are the same as FIG. 1 of the first preferred embodiment the same reference symbols are affixed, and their description will be curtailed.

In correspondence to the one of the above described formats which is selected, there are selectively shown in the field of view of the above described eyepiece lens 5 three types of picture frame: a first picture frame FR1 (FIG. 7) which corresponds to the first format, a second picture frame FR2 (FIG. 8) which corresponds to the second format, and a third picture frame FR3 (FIG. 9) which corresponds to the third format.

As shown in FIG. 6, as well as a pair of L-shaped picture frame determination members 107 and 108 being disposed symmetrically with respect to the optical axis AX on the focal plane (image plane) of the objective lenses 2 and 3, a cam mechanism 110 is provided for driving these picture frame determination members 107 and 108. Cam pins 107*a* and 107*b* are provided to the picture frame determination member 107, and cam pins 108*a* and 108*b* are provided to the picture frame determination member 108, said cam pins being pierced through these members 107 and 108 and projecting from both their faces. In the following discussion, whenever it is not particularly necessary to distinguish between the picture frames FR1 through FR3, reference will simply be made to "the picture frame FR". Either or both of the picture frame determination members 107 and 108 may be made of a light reducing material (for example ND filter with a transparency ratio of about 10%). Instead of a light reducing member, it is also acceptable to use opaque material in sheet form with a transparency ratio of 0%. The cam mechanism 110 is made up from a cam guide plate 111 which is provided confronting the sides of the picture frame determination members 107 and 108 on the side of the objective lens 3, and a cam drive plate 112 which is provided confronting the sides of the picture frame determination members 107 and 108 on the side of the prism 4.

First guide slots 113 through which the two cam pins 107*a* and 107*b* of the picture frame determination member 107 pass and second guide slots 114 through which the two cam pins 108*a* and 108*b* of the picture frame determination member 108 pass are formed in the cam guide plate 111 and serve for guiding the picture frame determination members 107 and 108. As shown in FIG. 7, the first guide slots 113 and the second guide slots 114 respectively have first straight line portions 113*a* and 114*a* parallel to the long sides of the picture frame FR defined upon the inside of the picture frame determination members 107 and 108, and second straight line portions 113*b* and 114*b* parallel to the short sides of the picture frames FR. As shown in FIG. 6, a rectangular opening 111*a* is formed in the center of the cam guide plate 111. The size of this opening 111*a* is set to be greater than that of the first picture frame FR1 which is to be defined by the picture frame determination members 107 and 108.

The cam drive plate 112 is supported by a support member not shown in the figures so as to be rotatable about the center CP of the picture frame FR (which agrees with the optical axis AX of FIG. 6). Upon the cam drive plate 112 there are formed a gear portion 112*a* which is meshed with a cam drive gear 115, and a pair of cam slots 112*b* through which cam pins 107*c* and 108*c* of the picture frame determination members 107 and 108 are passed. The cam slots 112*b* are provided straight roughly along the diagonal direction of the picture frame FR. The cam drive gear 115 is rotationally

driven by a picture frame switchover lever **116** (FIG. **6**). The picture frame switchover lever **116** may also be used as a selection lever for the above described format signal.

In the above described construction, when the picture frame switchover lever **116** is kept at the center of its range of movement, as shown in FIG. **7** the cam pins **107***a* and **107***b* of the picture frame determination member **107** are held at the boundary between the first straight line portions **113***a* and the second straight line portions **113***b* of the first guide slots **113**, while the cam pins **108***a* and **108***b* of the picture frame determination member **108** are held at the boundary between the first straight line portions **114***a* and the second straight line portions **114***b* of the second guide slots **114**, and the first picture frame FR1 is defined. When from the FIG. **7** position the picture frame switchover lever **116** is operated so as to rotate the cam drive gear **115** in the anticlockwise rotational direction, then the cam drive plate **112** is rotated in the clockwise rotational direction around the center CP of the picture frame FR, and as shown in FIG. **8** the cam pins **107***a* and **107***b* of the picture frame determination member **107** are shifted into the first straight line portions **113***a* of the first guide slots **113**, while the cam pins **108***a* and **108***b* of the picture frame determination member **108** are shifted into the first straight line portions **114***a* of the second guide slots **114**, and the second picture frame FR2 is defined. Moreover, the hatched regions AR1 in FIG. **8** show the difference between the first picture frame FR1 and the second picture frame FR2, in other words show the regions which are not printed when the second format is selected.

On the other hand, when from the FIG. **7** position the picture frame switchover lever **116** is operated so as to rotate the cam drive gear **115** in the clockwise rotational direction, then the cam drive plate **112** is rotated in the anticlockwise rotational direction around the center CP of the picture frame FR, and as shown in FIG. **9** the cam pins **107***a* and **107***b* of the picture frame determination member **107** are shifted into the second straight line portions **113***b* of the first guide slots **113**, while the cam pins **108***a* and **108***b* of the picture frame determination member **108** are shifted into the second straight line portions **114***b* of the second guide slots **114**, and the third picture frame FR3 is defined. Moreover, the hatched regions AR2 in FIG. **9** show the difference between the first picture frame FR1 and the third picture frame FR3, in other words show the regions which are not printed when the third format is selected.

As explained above, with this second embodiment, since it is possible to shift the picture frame determination members **107** and **108** respectively and individually in the direction parallel to one side of the picture frame and in the direction parallel to the other side thereof, thereby it is possible to vary the picture frame in any of the upwards, downwards, leftwards, and rightwards directions by any desired amount, even without reserving large spaces upwards, downwards, leftwards, or rightwards of the picture frame, and it is possible to propose a picture frame switching mechanism which is simple and also compact for an optical device like a camera in which the internal space is limited. Further, it is possible to vary the combination of the pair of picture frame determination members **107** and **108** so as to obtain a great variety of picture frames, and it is not necessary to provide any great variety of picture frame definition members.

With the above described second embodiment, by forming the cam guide plate **111** from opaque material, if the size of its opening **111***a* agrees with the first picture frame FR1, thereby the surround of the first picture frame FR1 in the field of view of the eyepiece lens **5** is always pitch black, and since the brightness of the hatched area AR1 or AR2 in FIG. **8** or FIG. **9**, when the second picture frame FR2 or the third picture frame FR3 is selected, is reduced in correspondence to the transparency ratio of the picture frame determination members **107** and **108**, therefore if this transparency ratio is not 0% the two types of picture frame can simultaneously be checked. It is beneficial to arrange for it to be possible to fix the picture frame switchover lever **116** by a notch mechanism or the like in positions respectively corresponding to the first picture frame FR1, the second picture frame FR2, and the third picture frame FR3. With a camera constructed so that it is possible to change the size of an aperture which is directly in front of the exposure plane of the film, whereby it is also possible to vary the size itself of the photographic picture which is recorded upon the film in correspondence with the above described first through third picture frames, it is possible to link together the movements of the picture frame switchover lever **116** and the aperture.

With the above described second embodiment, the positions of the picture frame determination members **107** and **108** in FIG. **7** correspond to their standard positions. Moreover, it would also be acceptable, as convenient alterations, to construct the first and second guide slots **113** and **114** for example as shown in FIG. **10A** in the shape of circular arcs, or as shown in FIG. **10B** to form them in the shapes of combined circular arcs and straight lines or the like.

Embodiment 3

The third embodiment of the present invention will now be explained with reference to FIG. **11** through FIG. **15**. FIG. **11** is a perspective diagram showing the overall structure of a real image type viewfinder optical system of a camera of the third embodiment to which the present invention is applied. To parts which are the same as FIG. **1** of the first preferred embodiment the same reference symbols are affixed, and their description will be curtailed. FIGS. **12A**, **13A**, and **14A** show the state of picture frame determination members **206** and **207** as seen from the side of a prism **4**, while FIGS. **12B**, **13B**, and **14B** are plan views of FIGS. **12A**, **13A**, and **14A** as seen from the direction of the arrows "b".

In this third embodiment, a first picture frame determination member **206** and behind it a second picture frame determination member **207** are respectively provided in the focal plane (the real image plane) of the objective lens **3**. By the second picture frame determination member **207** shifting in the directions following the long sides of the picture frame (the directions of the arrows Y in FIG. **11**) while being guided by a guide member **208** and by the first picture frame determination member **206** executing to and fro operation in the direction following the long sides of the picture frame in accompaniment with the shifting operation, three types of picture frame are determined within the optical path of the viewfinder: a first picture frame FR1 (FIG. **12A**) which corresponds to the first format, a second picture frame FR2 (FIG. **13A**) which corresponds to the second format, and a third picture frame FR3 (FIG. **14A**) which corresponds to the third format.

As shown in FIG. **12A**, when the second picture frame determination member **207** is withdrawn to the side of the first picture frame determination member **206** to the withdrawn position A, the first picture frame FR1 is defined within the viewfinder optical path by the opening **206***a* of the first picture frame determination member **206**. When as shown in FIG. **13A** the second picture frame determination

member 207 is displaced along the rear (the prism 4 side) of the first picture frame determination member 206 as far as the superimposed encroaching position B, the second picture frame FR2 is defined by the opening 207*a* of the second picture frame determination member 207. When as shown in FIG. 14A the second picture frame determination member 207 has been displaced to a central stopping position C which is between the withdrawn position A and the encroaching position B so that its short side portion 207*b* encroaches towards the picture center CP from the short side of the first picture frame FR1 by just a specified amount δ, then the first picture frame determination member 206 is displaced towards the side of the second picture frame determination member 207 just by the above described predetermined amount δ from its position when defining the first picture frame FR1, and a third picture frame FR3 is defined by the short side portions 206*b* and 207*b* of these two members 206 and 207 (refer to FIG. 11) which is narrowed down from the first picture frame FR1 in the direction along its long sides.

The picture centers CP of all of the picture frames FR1 through FR3 lie upon the viewfinder optical axis AX. The picture frame determination members 206 and 207 are made from a light reducing material (for example ND filter with a transparency ratio of about 10%). However, it is also acceptable to make them from an opaque material. The hatched regions AR1 in FIG. 13A are regions showing the difference between the first picture frame FR1 and the second picture frame FR2, that is to say the non printed regions when the second format is selected, while the hatched regions AR2 in FIG. 14A are regions showing the difference between the first picture frame FR1 and the third picture frame FR3, that is to say the non printed regions when the third format is selected.

Although various constructions can be conceived of as mechanisms for realization of the movement of the above described picture frame determination members 206 and 207, in this third embodiment this mechanism is constructed in the following manner. Now, since in the following it is not particularly necessary to distinguish between the picture frames FR1 through FR3, reference will simply be made to "the picture frame FR".

A rack 210 is integrally formed on the lower side of the second picture frame determination member 207 in order to drive the second picture frame determination member 207 to and fro along the guide member 208, and this rack 210 is meshed with a pinion gear 211, with this pinion gear 211 being coaxially linked to a picture frame switchover lever 212 (FIG. 11). When the picture frame switchover lever 212 is rotated, according to its position, the second picture frame determination member 207 is shifted to its above described withdrawn position A, encroaching position B, or central stopping position C. Moreover, it would be beneficial to arrange for it to be possible to fix the picture frame switchover lever 212 by a notch mechanism or the like in positions respectively corresponding to the above described three positions. The picture frame switchover lever 212 may also be used as a selection lever for the above described format signal. Moreover, with a camera constructed so that it is possible to change the size of an aperture which is directly in front of the exposure plane of the film, whereby it is also possible to vary the size itself of the photographic picture which is recorded upon the film in correspondence with the above described first through third picture frames, it is possible to link together the movements of the picture frame switchover lever 212 and the aperture.

Further, a cam mechanism 215 is provided in order to link the first picture frame determination member 206 with the second picture frame determination member 207 and so as to drive it to and fro in the direction along the long sides of the picture frame FR. This cam mechanism 215 is constructed from cam pins 206*c* and 207*c* which are respectively provided on the upper sides of the first and the second picture frame determination members 206 and 207, a cam plate 216 which comprises two cam slots 216*a* and 216*b* into which these cam pins 206*c* and 207*c* penetrate, and a tension spring 218 which is disposed between the cam plate 216 and a fixed member 217 (for example the body of the camera). The cam plate 216 is rotatable about a support pivot shaft 216*c* which is parallel to the short sides of the picture frame FR, and is rotationally biased in the clockwise rotational direction CW in FIG. 11 by the tension force of the tension spring 218.

The cam slots 216*a* and 216*b* of the cam plate 216 are set so that the first picture frame determination member 206 is shifted in the direction opposite to that of the second picture frame determination member 207 when the second picture frame determination member 207 shifts between the withdrawn position A and the central stopping position C described above, while the first picture frame determination member 206 is shifted in the same direction as the second picture frame determination member 207 when the second picture frame determination member 207 shifts between the central stopping position C and the encroaching position B described above. That is to say, when the second picture frame determination member 207 is in its central stopping position C, the cam pin 207*c* is positioned at the angle point 260 of the cam slot 216*b*. When the second picture frame determination member 207 is positioned in the direction more towards the withdrawn position A from the central stopping position C, then the cam pin 207*c* is shifted into a first straight portion 261, and due to this, the farther the second picture frame determination member 207 is from its withdrawn position A, the more is the cam plate 216 rotated in the anticlockwise rotational direction CCW about the support pivot shaft 216*c*, so that the cam pin 206*c* engaged with the cam slot 216*a* and the first picture frame determination member 206 integrally formed with this cam pin 206*c* are shifted in the opposite direction from the second picture frame determination member 207. But, when the second picture frame determination member 207 is positioned in the direction more towards the encroaching position B from the central stopping position C, then the cam pin 207*c* is shifted into a second straight portion 262, and due to this, the closer the second picture frame determination member 207 is to its encroaching position B, the more is the cam plate 216 rotated in the clockwise rotational direction CW about the support pivot shaft 216*c*, so that the first picture frame determination member 206 is shifted in the same direction as the second picture frame determination member 207.

In FIG. 15 there is shown the positional correspondence between the second picture frame determination member 207 and the cam plate 216. As will be clear from this figure, when the second picture frame determination member 207 is shifted from either of its withdrawn position A and its encroaching position B to the other one thereof, the cam plate 216 and the first picture frame determination member 206 make a round trip changing their directions at the central stopping position C.

Since as explained above it is possible to define three types of picture frame just by causing the second picture frame determination member 207 of this embodiment to execute a round trip in the direction following the long sides of the picture frame FR, it is not necessary to arrange for any possibility for displacing any members, which define the

third picture frame FR3, in the up and down direction of the picture frame FR, and it is not necessary to guarantee any space for movement of such members in the directions following along the short sides of the picture frame FR. Accordingly, in the case of application to a camera in which the viewfinder optical system and the photographic lens are superimposed in the direction following along the short sides of the picture frame FR, it is not necessary to provide any space for movement of the picture frame between the viewfinder optical system and the photographic lens, and it is possible to compress the interval between the viewfinder optical system and the photographic lens and to reduce the parallax. Moreover, although in this third embodiment the entire first picture frame determination member **206** was moved, it would also be acceptable, as an alternative, to move to and fro only the short side **206***b*. It would also be acceptable to define one of the short sides of the first picture frame FR1 by the short side **207***b* of the second picture frame determination member **207**. In the case that the direction of movement of the picture frame FR is taken as following along its short sides, it is possible to reduce the space required in the direction of movement, as compared to the case in which the picture frame is moved in the direction following along its long sides.

Furthermore, it would also be acceptable to utilize a link mechanism as the mechanism for moving the two first picture frame determination members together, for example, instead of the cam mechanism.

The explanation relating to the above described embodiment was in terms of a picture frame switching mechanism of a camera viewfinder. However, this picture frame switching mechanism can also be used as an switching mechanism for an aperture frame directly in front of the exposure plane of the film.

Embodiment 4

The fourth embodiment of the present invention will now be explained with reference to FIG. **16** through FIG. **20**. FIG. **16** is an exploded perspective diagram showing a picture frame switching mechanism of a real image type viewfinder optical system of a camera of the fourth embodiment to which the present invention is applied, and the vicinity thereof. FIGS. **17** through **19** are figures showing the states in which the picture frames are respectively switched over to, while FIG. **20** is a comparison view with an exemplar prior art. In FIG. **16**, **301** is a focus plate upon which an image of an object to be photographed is focused, and **302** is a holder which is equipped with a cutaway hole **302***a* of rectangular shape into which the focus plate **301** is fitted. A fixed mask **303**, a first movable mask **304**, and a second movable mask **305** are superimposed upon the holder **302** in that order in the direction of the optical axis X. These masks **303** through **305** are made of an opaque material, and cutaway holes **303***a*, **304***a*, and **305***a* respectively in their central portions are formed there for defining picture frames of rectangular shape within the focus plate **301**. The fixed mask **303** is held fixed in one position upon the holder **302** by holes **303***b* and **303***c* for determining its position being engaged over pins **302***b* and **302***c* of the holder **302**. Long holes **304***b*, **304***c*, **305***b*, and **305***c* which are engaged over the pins **302***b* and **302***c* are formed in the movable masks **304** and **305**, so that accordingly the movable masks **304** and **305** can be shifted in the lengthwise directions of the long holes **304***b*, **304***c*, **305***b*, and **305***c* with respect to the fixed mask **303**.

A mask drive member **306** is disposed at the side (the left side in FIG. **16**) of the masks **303** through **305** which are superimposed upon the holder **302**. A pair of shafts **306***a* and **306***b* project from this mask drive member **306** in the direction of the optical axis, and the shaft **306***a* is fitted into a long hole **304***d* of the first movable mask **304**, into a long hole **303***d* of the fixed mask **303**, and into a long hole **302***d* of the holder **302**, while the shaft **306***b* is fitted into a long hole **305***d* of the second movable mask **305**. A mask pressure plate **307**, which is provided with a cutaway hole **397***a* of almost identical shape and size to the cutaway hole **302***a* of the holder **302**, is superimposed over the front sides of the mask drive member **306** and the second movable mask **305**. At this time, a pivot shaft **306***c* of the mask drive member **306** (refer to FIGS. **17** through **19**) is fitted into a fitting hole **307***c* which is formed in a shaft receiving portion **307***b* of the mask pressure plate **307**, so that the mask drive member **306** is thereby supported so as to be rotatable around this central shaft **306***c*. The pivot shaft **306***c* lies outside a first picture frame F1 (FIG. **17**) which will be described hereinafter. An operation lever **306***d* upon the outer periphery of the mask drive member **306** projects to the outside of the mask pressure plate **307** through a slot **307***e* which is between the shaft receiving portion **307***b* and an arm **307***d*. When the mask pressure plate **307** is to be fitted, the pins **302***b* and **302***c* which project from the long holes **305***b* and **305***c* of the second movable mask **305** are pressed into engagement holes not shown in the figure in the mask pressure plate **307**. Accordingly, the focus plate **301**, the holder **302**, the masks **303** through **305**, the mask drive member **306**, and the mask pressure plate **307** are assembled so as to constitute a single unit. This assembled unit is fitted into the camera so that the focus plate **301** is in agreement with the focal plane (the real image plane) of the objective lens of the viewfinder.

As shown in FIGS. **17** through **19**, three concave portions **307***f*, **307***g*, and **307***h* are formed upon the inner peripheral surface of the arm **307***d*. When the operation lever **306***d* is removed from these concave portions **307***f* through **307***h*, as shown by double dotted lines in FIG. **18** and FIG. **19** the arm **307***d* is displaced sideways around its base end portion **307***i* as an axis; while, when the operation lever **306***d* is engaged with any one of these concave portions **307***f* through **307***h*, the arm **307***d* returns to its original position (the solid lines) and the mask drive member **306** is constrained. Moreover, FIGS. **17** through **19** show the relationships between the cutaway hole **303***a* of the fixed mask **303** and the movable masks **304** and **305**, the mask drive member **306** and the arm **307***d* of the mask pressure plate **307** in the state as seen from the direction of the arrow A in FIG. **16**.

In the above described mechanism, when the operation lever **306***d* is displaced along the slot **307***e* the mask drive member **306** is rotated around the pivot shaft **306***c*, and the first movable mask **304** which is engaged with the shaft **306***a* of the mask drive member **306** is shifted in the lengthwise direction along the long holes **304***b* and **304***c*, the second movable mask **305** which is engaged with the shaft **306***b* of the mask drive member **306** is shifted along the lengthwise direction of the long holes **305***b* and **305***c*. In accompaniment with this, the positions of the cutaway holes **304***a* and **305***a* of the movable masks **304** and **305** which correspond to the cutaway hole **303***a* of the fixed mask **303** are changed, and, as shown in FIGS. **17** through **19**, the viewfinder picture frame is switched between the first picture frame F1, the second picture frame F2, and the third picture frame F3. Now, in FIGS. **17** through **19** the picture frames F1 through F3 are shown as hatched regions. The relationship between the picture frames F1 through F3 and the stopping positions of the mask drive member **306** can be suitably determined according to the shapes of the cutaway holes **304***a* and **305***a*,

and the long holes **304***b*, **304***c*, **305***b* and **305**, and the positions of linkage between the shafts **306***a* and **306***b* and the masks **304** and **305**, etc., but in particular, in this embodiment, they are set as will now be described.

First, when the operation lever **306***d* is engaged with the upper concave portion **307***f*, all of the edges e21, e22, e31, and e32 of the movable masks **304** and **305** which will be described hereinafter are withdrawn outside the cutaway hole **303***a* of the fixed mask **303**, and the first picture frame F1 is determined by the cutaway hole **303***a*. When from the situation shown in FIG. **17** the operation lever **306***d* is shifted to the central concave portion **307***g*, the first movable mask **304** is shifted in the leftwards and slantingly downwards direction following the long holes **304***b* and **304***c*, and the second movable mask **305** is shifted in the rightwards and slantingly upwards direction following the long holes **305***b* and **305***c*. By doing this, as shown in FIG. **18**, the upper side edge e21 of the cutaway hole **304***a* and the lower side edge e22 of the cutaway hole **305***a* encroach within the first picture frame F1, so as to determine the second picture frame F2. Next, when from the situation shown in FIG. **18** the operation lever **306***d* is shifted to the lower concave portion **307***h*, the first movable mask **304** is shifted in the leftwards and slantingly upwards direction following the long holes **304***b* and **304***c*, and the second movable mask **305** is shifted in the rightwards and slantingly downwards direction following the long holes **305***b* and **305***c*. By doing this, as shown in FIG. **19**, on the one hand the edges e21 and e22 of the cutaway hole **304***a* and the cutaway hole **305***a* are withdrawn outside the first picture frame F1, and on the other hand the right side edge e31 of the cutaway hole **304***a* and the left side edge e32 of the cutaway hole **305***a* encroach within the first picture frame F1, so as to determine the third picture frame F3.

In this manner, in this embodiment, the long holes **304***b*, **304***c*, **305***b*, and **305***c* are set so that, when the operation lever **306***d* of the mask drive member **306** and the concave portion **307***f* are engaged together, the movable masks **304** and **305** are kept in positions which correspond to the first picture frame F1, and so that, when from this position the mask drive member **306** is shifted in one direction, the movable masks **304** and **305** are shifted in order to positions which correspond to the second picture frame F2 and to the third picture frame F3. Accordingly, the edges e21 and e22 of the movable masks **304** and **305** are not withdrawn from the cutaway hole **303***a* in the directions following along the short sides of the picture frames F1 through F3 (up and down in the figures) by more than is necessary, and thereby the amounts of movement of the movable masks **304** and **305** in the directions following along the short sides of the picture frames F1 through F3 are made smaller than in the prior art. In this connection, when the V portion of FIG. **17** is compared by way of example with a prior art example, in the prior art, as shown in FIG. **20**, since the third picture frame F3 is obtained by the left side edge e1 of the cutaway hole **304***a* by providing the long hole **304***bb* which is symmetrical with respect to the position in which the first picture frame F1 is obtained, it is necessary to shift the first movable mask **304** in the upwards direction from the position in which the first picture frame F1 was obtained just by δ in the figure more in excess. Moreover, although δ is brought to zero by providing the long hole **304***bb* horizontally in a region more to the left from the pin **302***b* of FIG. **20**, since in this case the play of the mask **304** in the direction following along the long sides of the third picture frame F3 cannot be regulated by the engagement portions of the pin **302***b* and the long hole **304***bb*, the wobbling of the edge e1 in the third picture frame F3 becomes large. In order to avoid this, it is necessary to slope the long hole **304***bb* with respect to the direction following along the long sides of the third picture frame F3, and for this reason δ is unavoidably created. In this embodiment, although in the FIG. **18** state the play of the masks **304** and **305** in the direction following along the long sides (the left and right direction) is not regulated, no problem arises, because in this state the masks **304** and **305** are drawn back from the short sides of the second picture frame F2.

Further, with the fourth embodiment, since the position of the rotation axis **306***c* of the mask drive member **306** is set to be outside the first picture frame F1, it is possible to package up the mask drive member **306** and the mechanism which restrains it in its predetermined positions on one side portion of the masks **303** through **305** in a compact manner. In particular, when compared with the prior art shown in FIG. **21**, the drive members are removed from the upper sides and the lower sides of the picture frames F1 through F3, and the picture frame switching mechanism is reduced in size in the direction following along the short sides of the picture frames F1 through F3. Further, since the mask drive member **306** is supported at its center of rotation, stability is assured, and the operating feeling of the mask drive member **306** is enhanced. Yet further, picture frames are obtained according to planned values by reliably stopping the movable masks **304** and **305** by the click mechanism at positions which are according to plan. Moreover, since it is possible to arrange the click mechanism in the vicinity of the position of support of the mask drive member **306**, along with guaranteeing the accuracy of position determination of the movable masks, it is possible to enhance the feeling of rigidity when operating the mask drive member **306** by restraining the twisting and the bending when rotating the drive member against the binding power of the click mechanism. Furthermore, it is possible to add on a click mechanism just by increasing a little the size of the member which supports the mask drive member **306**, and thereby increase of the number of parts and of the number of processes during assembly is checked.

Moreover, although with the fourth embodiment the frame shaped masks **304** and **305** which had the cutaway holes **304***a* and **305***a* were used, it would also be acceptable to vary the shape to L-shaped members or the like, provided that they had the above described edges e21, e22, e31, and e32. Further, although in this embodiment the amount of movement of the masks in the direction following along the short sides of the picture frames was restricted, it would also be possible, as an alternative, to arrange the construction so that the amount of movement in the direction following along the long sides was restricted. In this case, it would be acceptable to switch between the first picture frame F1 and the second picture frame F2 via the third picture frame F3.

The explanation relating to the fourth embodiment was in terms of a picture frame switching mechanism of a camera viewfinder. However, this picture frame switching mechanism can also be used as an switching mechanism for an aperture frame directly in front of the exposure plane of the film.

Embodiment 5

A fifth embodiment of the present invention will now be explained with reference to FIGS. **22** through **28**. FIGS. **22** through **24** are figures showing a viewfinder of a camera according to the fifth embodiment of the present invention and its vicinity. FIG. **22** is a plan view, FIG. **23** is an

elevation view, and FIG. 24 is a right side view. The leftward direction in FIGS. 22 and 23 corresponds to the forward direction of the camera (the side towards the object to be photographed), while the upward direction in FIGS. 23 and 24 corresponds to the upward direction on the camera. In FIGS. 22 through 24, 508 is a viewfinder block which can be removed and refitted to the camera body (not shown), and parts (514 through 521) which together constitute a viewfinder optical system are assembled to this viewfinder block 508. 514 through 516 are viewfinder lenses, and the lens 514 is fitted into a lens holder 522 while the lenses 515 and 516 are fitted into a lens holder 523.

The lens holders 522 and 523 are supported by a zoom rod 524 so as to be movable in the fore and aft direction with respect to the camera. This zoom rod 524 is arranged in the right and diagonally downward direction from the viewfinder block 508 as seen from the front surface of the camera, and its central axial direction is parallel to the optical axis of the variable magnification optical system which is constituted by the lenses 514 through 516. When the photographic optical system of the camera (not shown in the figures) is zoomed, in accompaniment therewith the lens holders 522 and 523 are driven in the fore and aft direction with respect to the camera by a lens cam which is not shown in the figures, and the magnification ratio of the viewfinder optical system is altered. A ray bundle which has passed through the lens 516 then passes through the lens 517 and is reflected by the mirror 518, and is then focused by the lens 519 upon a real image plane RP. By this, an image of the object to be photographed is formed upon the real image plane RP. This image of the object to be photographed is inspected by the photographer via a mirror not shown in the figures, a prism 520, and an eyepiece lens 521.

As shown in FIG. 22 by the double dotted chain line, a pair of AF lenses 512 mounted to holders 513 are fitted on both sides of the portion of the viewfinder block 508 in which the variable magnification operation region Z of the variable magnification optical system constituted by the lenses 514 through 516 is provided. These AF lenses 512 are provided for projecting predetermined beams of infrared light towards the object to be photographed in order to measure the distance to it, and for receiving this light which is reflected therefrom. A gap of a certain size is provided between one of the AF holders 513 (the lower one as seen in FIG. 22) and the viewfinder block 508 for serving as an accommodation region S for picture frame switchover masks 502 and 503 which will be described hereinafter. The above described zoom rod 524 is adjacent to the lower side of this accommodation region S. The AF lenses 512 and the holders 513 are omitted in FIGS. 23 and 24.

A picture frame switching mechanism is provided as positioned in the real image plane RP of the viewfinder block 508. A detailed exploded view of this picture frame switching mechanism as seen slantingly from below is shown in FIG. 25. The direction in FIG. 25 designated by the arrow M corresponds to the direction in FIG. 22 in which the mirror 518 is seen from the real image plane RP. The reference numeral 501 in FIG. 25 denotes a focal plate of the viewfinder optical system which is arranged in the real image plane RP (FIG. 22), while 505 denotes a holder in which the focal plate 501 is held and which is provided with a rectangular cutout hole 505*a*. A reference picture frame mask 506 which specifies a picture frame for the viewfinder which corresponds to the normal photographic range and a pair of picture frame switchover masks 502 and 503 are superimposed in order onto the holder 505. The masks 502, 503, and 506 are made from light intercepting material, and rectangular cutout holes 502*a*, 503*a*, and 506*a* are formed in their central portions. The reference picture frame mask 506 is held in a fixed position upon the holder 505 by a pair of pins 505*b* of the holder 505 being engaged with a pair of position determining holes 506*b* thereof. The picture frame switchover masks 502 and 503 are mounted to the holder 505 by the pins 505*b* being engaged with respective long holes 502*b* and 503*b* thereof.

A mask drive member 504 is arranged at the side of the masks 502, 503, and 506 which are superimposed onto the holder 505. A pair of shafts 504*a* and 504*b* are formed upon this mask drive member 504, and the shaft 504*a* is engaged with the long hole 502*c* of the picture frame switchover mask 502, while the shaft 504*b* is engaged with the long hole 503*c* of the picture frame switchover mask 503. A pressure plate 507 is further superimposed on the outside of the mask drive member 504 and the picture frame switchover mask 503. At this time, the shafts 505*b* of the holder 505 are pressed inward into fitting holes in the pressure plate 507 which are not shown in the figures. The mask drive member 504 is supported by a central shaft being inserted into a reception hole not shown in the figure of the pressure plate 507 so as to be rotatable about the central shaft 504*c* thereof. When, for example, the mask drive member 504 is rotated in the clockwise direction as seen in FIG. 25, then the picture frame switchover mask 502 is shifted by the shaft 504*a* in the direction of the long holes 502*b* so as to be pushed out, and moreover the picture frame switchover mask 503 is shifted by the shaft 504*b* in the direction of the long holes 503*b* so as to be pulled. When the mask drive member 504 is rotated in the anticlockwise rotational direction, then the picture frame switchover masks 502 and 503 are driven in the reverse directions to the above described ones. The picture frame of the viewfinder is switched over by these movements of the masks 502 and 503. The details will be described hereinafter. Moreover, a cutout hole 507*a* is provided in the pressure plate 507, so that the picture frame of the viewfinder which is defined by the masks 502, 503, and 506 should not be concealed.

The focal plate 501, the masks 502, 503, and 506, the mask drive member 504, the holder 505, and the pressure plate 507 are assembled together in the manner described above to constitute a single built up assembly. This built up assembly is inserted into the interior of the viewfinder block 508 through the hole portion 508*a* as shown by the arrow A in FIG. 25, and is pressed inward towards the hole portion 508*b* on the other side thereof. In the state where the built up assembly is fitted to the viewfinder block 508, the position of the focal plate 501 agrees with the real image plane RP of FIG. 22, and the position of the picture frame switchover masks 502 and 503 disposed in its vicinity is determined so as to connect with the accommodation region S of FIG. 22 in the fore and aft direction of the camera.

On the rear surface of the camera (the surface upon which the eyepiece lens 521 of FIGS. 22 through 24 is exposed) there is fitted a switchover knob 509 which can be operated by being slid in the leftwards and rightwards direction of the camera (the direction shown by the arrow B in FIG. 25). Inside the camera, there are provided a cam plate 510 which is slid in the same direction as the switchover knob 509 and a drive arm 511 which is engaged via a cam pin 511*a* with a cam groove 510*a* of the cam plate 510. Along with the sliding operation of the cam plate 510, the drive arm 511 is rotated around a rotational support point 511*b* in the direction of the arrow C, and its end portion 511*c* contacts the lower surface of a drive shaft 504*d* of the mask drive member 504. The mask drive member 504 is normally

biased in the direction for this drive shaft **504***d* to contact the drive arm **511** by a biasing means such as a spring or the like which is not shown in the figure. Accordingly, when the switchover knob **509** is operated by being slid, the mask drive member **504** is rotationally driven within a predetermined rotational driving range, either in the clockwise direction or in the anticlockwise direction according to its direction of operation, and the picture frame of the viewfinder is switched over. Moreover, the above described biasing means will not be necessary if the construction is such that the drive shaft **504***d* is squeezed at the end portion **511***c* of the drive arm **511** so that the drive shaft **504***d* is stopped by the end portion **511***c* whichever way the drive arm **511** is rotated.

FIGS. **26** through **28** show states of the viewfinder picture frame which have been switched over by the above described masks **502**, **503**, and **506**. Moreover, each of FIGS. **26** through **28** shows an unobstructed view of a state of the picture frame switching mechanism of FIG. **25** as seen from its right upper side in the direction of the arrow M in the same figure. Accordingly, the leftward direction in FIGS. **26** through **28** corresponds to the frontward direction of the camera (towards the object to be photographed), while the upward direction in these figures corresponds to the upward direction of the camera. Further, in FIGS. **26** through **28**, the picture frames which are displayed within the viewfinder are shown by hatching. FIG. **26** is the state with the mask drive member **504** rotationally driven to the maximum in the anticlockwise direction as seen in FIG. **25** in its rotational drive range. In this state, the picture frame switchover masks **502** and **503** are outside the frame of the cutout hole **506***a* of the reference picture frame mask **506**, and a rectangular shaped first picture frame **F1** is defined only by the reference picture frame mask **506**. When from the state of FIG. **26** the mask drive member **504** is rotationally driven in the clockwise direction as far as an almost central position within its drive range, the state of FIG. **27** is established. In this state, a second picture frame **F2** is defined by the long sides of the first picture frame **F1** of FIG. **26** being shaded by a predetermined amount by the picture frame switchover masks **502** and **503**. When from the state of FIG. **27** the mask drive member **504** is further rotationally driven in the clockwise direction, the state of FIG. **28** is established. In this state, a third picture frame **F3** is defined by the short sides of the first picture frame **F1** of FIG. **26** being shaded by a predetermined amount by the picture frame switchover masks **502** and **503**. When the picture frame is switched over as described above, the picture frame switchover masks **502** and **503** are selectively projected from the viewfinder block **508** towards the front of the camera, and these projecting portions are accommodated in the accommodation region S. That is, in the state of FIG. **26** the picture frame switchover mask **503** is accommodated in the accommodation region S, and in the state of FIG. **28** the picture frame switchover mask **502** is accommodated in the accommodation region S.

The accommodation region is not limited to the one explained above; for example, it would also be acceptable to arrange elements which constitute a photometric means or a strobe at the side of the viewfinder block, and to provide an accommodation region for the picture frame switchover members in the gap between them. Although in this fifth embodiment any one of three picture frames was selectably defined by two superimposed types of picture frame switchover members, it would also be acceptable for either of two picture frames to be selectably defined by a single picture frame switchover member

Embodiment 6

A sixth embodiment of the present invention will now be explained with reference to FIGS. **29** through **31**. The sixth embodiment is an embodiment which resembles the fifth embodiment, but in the sixth embodiment the method of assembling the picture frame switching mechanism will principally be explained. Moreover, although in the fifth embodiment and the sixth embodiment many elements are duplicated, for the convenience of explanation new reference symbols will be affixed to the duplicated elements in the explanation which is made using the new figures (FIGS. **29** through **31**).

FIG. **29** is an exploded perspective view of a picture frame switching mechanism of a viewfinder according to the present invention as seen slantingly from below. FIG. **30** is a perspective view of this viewfinder picture frame switching mechanism in the inserted state as seen in the same manner slantingly from below. Accordingly, the upwards direction in FIGS. **29** and **30** is the downwards direction upon the camera. Moreover, FIG. **29** has the same contents as FIG. **25** for the fifth embodiment and the showing direction is different from each other.

In a picture frame switching mechanism **610** of the viewfinder, as shown in FIGS. **29** and **30**, the various constructional members are temporarily assembled together into a single unit, and the various constructional members in this temporarily assembled state are inserted from the side through insertion holes **632***a* and **632***b* (FIG. **29**) which are formed in side wall portions **631**A and **631**B of a viewfinder block **631** which is included in the housing of the real image type viewfinder **630** shown in FIGS. **31**A through **31**C which confront one another with a predetermined gap between them, thus the picture frame switching mechanism **610** is assembled into and fixed.

Referring to FIG. **29**, this picture frame switching mechanism **610** comprises a focus plate **611** which is disposed upon the viewfinder optical path of the real image type viewfinder **630** at a portion thereof upon which is focused an image of the object to be photographed. This focus plate **611** is gripped and supported by a holder **612** including a support window portion **612***a*, which constitutes a support member therefor. A picture frame **613** in which an opening **613***a* of normal size, which corresponds to a viewfinder picture frame for the normal photographic range when the viewfinder is looked through and the aspect ratio of which is a normal picture, is formed is disposed so as to be superimposed against the front surface of this holder **612**, and the aforesaid focus plate **611** is held between them. This picture frame **613**, together with the holder **612**, constitutes a support member for the focus plate **611**.

Moreover, in the real image type viewfinder **630**, the side of the above described focus plate **611** towards the picture frame **613** is the real image surface.

614 and **615** are mask plates which are arranged on the front surface of the above described picture frame **613** and which switch over the above described viewfinder picture frame, and opening portions **614***a* and **615***a* are formed in these mask plates **614** and **615** and serve as frames for picture frame switchover for selectively covering over the upper and lower edge portions, or the left and right edge portions, of the opening **613***a* in the above described picture frame **613**.

616 is a pressure plate which is arranged on the front side so as to press these mask plates **614** and **615** while leaving them free to move, and this pressure plate **616** has holes into which are pressed the projections **612***b*, **612***c*, and **612***d* which are provided in the front surface of the above described holder **612** so as to project therefrom, whereby the pressure plate **616** is unitarily attached to the holder **612** at

a fixed gap with respect thereto so as to constitute a mechanical base. An opening **616***a* of this pressure plate **616** is formed of a size which is set larger than the opening **613***a* of the above described picture frame **613**, so as to be larger than the sizes of the picture frames to which this mechanism **610** is switched over.

In this connection, cam grooves **614***b* and **615***b*, and **614***c* and **615***c* are formed in the aforesaid mask plates **614** and **615**, in order for these mask plates to be moved in the required directions. Two projections **612***b* and **612***c* from the projections which are provided as projecting from the aforesaid holder **612** are respectively engaged with by being passed through these cam grooves **614***b* and **615***b*, and **614***c* and **615***c*. By this, the mask plates **614** and **615** are moved between the holder **612** and the pressure plate **616** in the required directions according to the shapes of the cam grooves **614***b* and **615***b*, and **614***c* and **615***c*.

Moreover, holes **613***b* and **613***c* are opened in the aforesaid picture frame **613** and the projections **612***b* and **612***c* fitly pass through them.

617 is a drive member which is disposed between the picture frame **613** and the mask plates **614** and **615** which are superimposed in order on the front side of the holder **612** and the pressure plate **616**. This drive member **617** presents a roughly circular plate shape, and is axially supported so as to freely rotate by a shaft portion **616***c* which is unitarily provided as projecting at a cutaway portion **616***b* for reception which is formed so that one portion of the above described pressure plate **616** is thin. Further, engagement projections **617***a* and **617***b* are provided on the side of this drive member **617** towards the mask plates **614** and **615** at a certain prescribed interval apart in the circumferential direction and projecting in the radially outward direction and in the rearward direction.

These engagement projections **617***a* and **617***b* are portions for driving the aforesaid mask plates **614** and **615** in accompaniment with the rotation of this drive member **617**, and slots for engagement **614***d* and **615***d* are formed in each of the mask plates **614** and **615** for respectively engaging therewith. Moreover, the end of one of the engagement projections **617***a* is inserted into and engaged with circular arc shaped groove portions **613***d* and **612***e* formed in the aforesaid picture frame **613** and holder **612**.

An engagement arm portion **617***c* is provided as projecting from an eccentric position on the side of the pressure plate **616** of the aforesaid drive member **617**. This engagement arm portion **617***c* is formed so as to face in the forward direction from a cutaway portion **616***d* which is formed on a side portion of the pressure plate **616**.

When this sort of drive member **617** is rotationally driven in the clockwise rotational direction in FIG. **29**, it drives the mask plate **614** due to its engagement with the engagement projection portion **617***a* and the slot **614***d* so as to press it out in the rightwards direction in FIG. **29**, and by this the mask plate **614** is shifted along the cam grooves **614***b* and **614***c*. In the same manner, when the drive member **617** is rotationally driven in the anticlockwise rotational direction in FIG. **29**, the mask plate **615** is shifted so as to be pulled inward in the leftward direction in FIG. **29**, and is shifted along the cam grooves **615***b* and **615***c*. And the size of the viewfinder picture frame is switched over by the upper and lower edges, or the left and right edge portions, of the focus plate **611** being covered over by the edge portions of the opening portions **614***a* and **615***a* of these two mask plates **614** and **615**.

The assembly of the picture frame switching mechanism **610** is performed by superimposing in order the above holder **612**, the focus plate **611**, the picture frame **613**, the mask plates **614** and **615**, and the pressure plate **616**, and by interposing the drive member **617** between the mask plates **614** and **615** and the pressure plate **616** so as to form a temporarily assembled unit, and by then inserting this temporary unit as shown by the arrow A in FIG. **29** into the insertion holes **632***a* and **632***b* which are formed in the side wall portions **631**A and **631**B which define the viewfinder block **631** of the viewfinder **630**.

620 is a switchover knob which is exposed on the outside of the camera and which is freely manually operated, and is operated in the direction shown by the arrow B in FIG. **29**. **621** is a cam plate which is shifted in the direction shown by the arrow B in FIG. **29** by being linked with this switchover knob **620**. A cam groove **621***a* which is made up from three horizontal grooves and two sloping grooves which link them is formed in this cam plate **621**.

622 is a swinging member which freely swings upon a pivot hole **622***a* thereof which is axially supported upon a shaft which is provided integrally with a camera cover but is not shown in the figure, and an engagement pin **622***b* which is formed as projecting upon a side portion of this swinging member **622** is engaged into the cam groove **621***a* of the aforesaid cam plate **621**. Accordingly, when the aforesaid cam plate **621** is shifted in the direction of the arrow B in FIG. **29**, the engagement pin **622***b* follows the cam groove **621***a* with which it is engaged, and the swinging member **622** is pivotally driven in the direction of the arrow C in FIG. **29** about the pivot hole **622***a* as a rotational center.

An engagement portion **622***c* which is engaged with the engagement arm portion **617***c* of the drive member **617** of the picture frame switching mechanism **610** described above is formed at the swinging end of this swinging member **622**. And, when in accompaniment with the switching over operation of the aforesaid switch over knob **620** this swinging member **622** is pivoted, the engagement arm portion **617***c* is raised (is pressed downwards, if it is seen slantingly from below as shown in the figure) by the aforesaid engagement portion **622***c* as shown by the arrow D in FIG. **29**, and due to this the above described drive member **617** comes to be rotationally driven in the anticlockwise direction in FIG. **29**.

Now, this drive member **617** is biased in the clockwise direction in FIG. **29** by a spring which is not shown in the figure, and, due to this, this drive member **617** is rotationally driven together with the pivoting operation of the aforesaid swinging member **622**, and its drive force comes to be transmitted to the aforesaid mask plates **614** and **615**. Moreover, it would also be acceptable for the engagement portion **622***c* at the swinging end of the swinging member **622** to be formed so as to grip the engagement arm portion **617***c* of the drive member **617**.

The picture frame switching mechanism **610** constituted as described above is temporarily assembled into a single unit, and its state as inserted into a portion of the viewfinder block **631** and fixed is shown in FIG. **30**; this FIG. **30** is a figure in which the picture frame switching mechanism **610** is seen slantingly from below.

The switching over of the picture frame of the viewfinder with this picture frame switching mechanism **610** constituted as described above is the same as in the fifth embodiment of FIG. **5**, and accordingly its explanation will be curtailed.

FIGS. **31**A through **31**C show the picture frame switching mechanism **610** for a viewfinder according to this invention in the case that it is fitted to a real image type viewfinder **630**

which is used in a camera: FIG. 31A is a schematic sectional view of the essential elements as seen from a direction in the horizontal plane, FIG. 31B is a side view thereof, and FIG. 31C is a rear view.

In these figures, the viewfinder optical system is composed of elements **631** through **648**. In this viewfinder optical system, **645** is a mirror and **647** is a prism, and these are arranged as lined up in suitable positions upon a viewfinder optical axis **640** within a viewfinder block **631**. Moreover, the construction is such that this viewfinder optical axis **640** is reflected by the mirror **645**, a mirror not shown in the figure, the reflecting portion **647***a* and the like to arrive at an eyepiece portion **650**.

Moreover, since this type of real image type viewfinder **630** is one which has a construction which is well known, therefore the explanation of its concrete construction and function and the like herein will be curtailed.

In this connection, the reference numeral **651** in the figure denotes a shaft portion which is fixed to the viewfinder block **631**, while **652** and **653** are lens holders which are provided so as to shift along this shaft portion. Zooming of the viewfinder is performed by lenses **641**, **642**, and **643** which are the viewfinder optical system being suitably driven by these lens holders **652** and **653**.

For the viewfinder block **631** of this type of viewfinder **630**, the picture frame switching mechanism **610** described above is formed into a unit in a temporarily assembled state, and is inserted from the rear surface side of the viewfinder block **631** and is fixed.

Here, a position which is upon the viewfinder optical axis **640** and can ensure an assembly space, for example, the vicinity of the position of disposition of the prism **647** can be considered as an assembly position for this type of picture frame switching mechanism **610** in this real image type viewfinder **630**.

That is to say, according to this sixth embodiment, it is so arranged that the members which constitute the picture frame switching mechanism **610** which is capable of switching over viewfinder picture frames of a plurality of sizes of differing aspect ratios are inserted, in the state of being temporarily assembled together into a unit, into a portion of the viewfinder block **631** of the real image type viewfinder **630**, and are fixed.

To express it in other words, it is arranged that it is possible temporarily in advance to assemble all of the constructional parts which constitute the picture frame switching mechanism **610** into a unit, and the assembly of the picture frame switching mechanism **610** to the viewfinder **630** is performed by inserting this unit into a specific place of the viewfinder block **631**, i.e., with the real image type viewfinder **630**, into insertion holes **632***a* and **632***b* which are provided in the side wall portions **631**A and **631**B in the vicinity of the real image surface. And, according to this picture frame switching mechanism **610** which can be assembled by simple insertion into a specified place of the viewfinder block **631** in this manner, it is possible positionally to displace the mask plates **614** and **615** and so on when switching over the picture frame in a required condition in which there is no occurrence of play or the like, and it is possible reliably to switch over the viewfinder picture frame to suitable sizes which have different aspect ratios.

In particular, according to this type of construction, it is possible to manufacture the picture frame switching mechanism **610** according to a simple construction, and its assembly can be performed easily, and moreover it is possible to assemble it simply within the viewfinder block.

Moreover, the present invention is not limited to the construction of the above described sixth embodiment; the form and the construction and the like of the various parts of the viewfinder **630** and the switching mechanism **610** for the viewfinder picture frame may be varied and changed as is suitable. For example, although with the above described sixth embodiment the case of application of the present invention to the real image type viewfinder **630** was shown by way of example, the present invention is not limited to this case, and it can also be applied to a viewfinder of any suitable type. That is to say, the present invention can be applied to any kind of viewfinder, provided that it has a construction in which the members which constitute the picture frame switching mechanism **610** for the viewfinder can be inserted in the superimposed state into the viewfinder block **631** in the vicinity of a surface of a real image of the object to be photographed and can be fixed.

Although the above explanations relating to the first through the sixth embodiments have been made in terms of a camera, the present invention is not limited to a camera; it can also be utilized for switching over the picture frame in various other optical devices.

We claim:

1. A picture frame switching mechanism, comprising:

a plurality of picture frame definition members whose relative position in a plane perpendicular to an optical axis of an optical system is changed so as to switch picture frames;

a first portion of one of said picture frame definition members receiving driving force from a drive section which drives some of said plurality of picture frame definition members; and

a second portion of said one picture frame definition member forming a linked driving section which drives others of said picture frame definition members in linkage according to predetermined conditions with operation of said drive section.

2. A picture frame switching mechanism according to claim **1**, wherein said optical system is a viewfinder optical system which is provided separately from a photographic optical system of a camera.

3. A picture frame switching mechanism according to claim **1**, wherein said picture frame definition members are made from a light reducing material.

4. A picture frame switching mechanism according to claim **1**, wherein:

said plurality of picture frame definition members includes a first definition member which defines a picture frame related to a first direction perpendicular to an optical axis of said optical system, and a second definition member which defines a picture frame related to a second direction perpendicular to both of said optical axis and said first direction;

a reference picture frame is defined when said first definition member is in a first standard position and said second definition member is in a second standard position;

said drive section is provided so as to drive said first definition member to and fro in said first direction; and

said linked driving section keeps said second definition member at said second standard position or farther from said optical axis than said second standard position when said first definition member approaches to said optical axis closer than said first standard position, and brings said second definition member closer to said optical axis than said second standard position when

said first definition member is at said first standard position or farther from said optical axis than said first standard position.

5. A picture frame switching mechanism according to claim 4, further comprising

a standard frame determination member which fixes a position of said picture frame in relation to said first direction at a position corresponding to said first standard position when said first determination member is at said first standard position or farther out than said first standard position, and fixes a position of said picture frame in relation to said second direction at a position corresponding to said second standard position when said second determination member is at said second standard position or farther out than said second standard position.

6. A picture frame switching mechanism according to claim 4, wherein said first definition member and said second definition member are each provided as a pair symmetrical with respect to said optical axis, and said drive section drives to and fro the pair of first definition members along said first direction in mutually opposite directions.

7. A picture frame switching mechanism according to claim 4, wherein said linked driving section comprises a cam mechanism which treats said first definition member as a driver and said second definition member as a follower.

8. A picture frame switching mechanism according to claim 5, wherein said plurality of picture frame definition members switches between three picture frames: a first picture frame which is formed when said first definition member is at said first standard position or farther from said optical axis than said first standard position and said second definition member is at said second standard position or farther from said optical axis than said second standard position, a second picture frame which is formed when said first definition member is at said first standard position or farther from said optical axis than said first standard position and said second definition member is in a vicinity of said optical axis, and a third picture frame which is formed when said first definition member is in a vicinity of said optical axis and said second definition member is at said second standard position or farther from said optical axis than said second standard position.

9. A picture frame switching mechanism, comprising:

a pair of L-shaped picture frame definition members which are opposingly disposed along the diagonal direction of a rectangular shaped picture frame; and

a guide member which guides said picture frame definition members so as to change said picture frame over between a plurality of types by displacing said picture frame definition members in mutually opposite directions in a plane parallel to said picture frame, and by changing the directions of displacement of said pair of picture frame definition members en route of their respective displacements.

10. A picture frame switching mechanism according to claim 9, wherein said picture frame definition members and said guide member are provided to a viewfinder optical system which is provided separately from a photographic optical system of a camera.

11. A picture frame switching mechanism according to claim 9, wherein said picture frame definition members are made from a light reducing material.

12. A picture frame switching mechanism according to claim 9, wherein said guide member displaces said pair of picture frame definition members from a predetermined standard position for said pair of picture frame definition members, on a one side parallel to one side of said picture frame, and on another side perpendicular to said one side of said picture frame.

13. A picture frame switching mechanism according to claim 12, wherein said pair of picture frame definition members switches between three picture frames: a first picture frame which is defined by said predetermined standard position of said pair of picture frame definition members, a second picture frame which is defined when said pair of picture frame definition members have been displaced parallel to said one side of said picture frame from said predetermined standard position, and a third picture frame which is defined when said pair of picture frame definition members have been displaced perpendicular to said one side of said picture frame from said predetermined standard position.

14. A picture frame switching mechanism, comprising:

a first picture frame definition member which defines a rectangular shaped first picture frame; and

a second picture frame definition member which is provided so as to be shiftable between an encroaching position in which said second picture frame definition member encroaches into said first picture frame by being superimposed in a direction of an optical axis upon said first picture frame definition member and a withdrawn position in which said second picture frame definition member is withdrawn outside from one side of said first picture frame, and in said encroaching position defines a second picture frame by narrowing down said first picture frame in a first direction parallel to said one side, and when shifted to a central stopping position between said encroaching position and said withdrawn position defines a third picture frame along with said first picture frame definition member by narrowing down said first picture frame in a second direction which is perpendicular to said first direction.

15. A picture frame switching mechanism according to claim 14, wherein:

said first picture frame definition member and said second picture frame definition member are provided to a viewfinder optical system which is provided separately from a photographic optical system of a camera; and

said second direction is set in a direction which differs from a direction in which said photographic optical system and said viewfinder optical system are lined up.

16. A picture frame switching mechanism according to claim 14, wherein said picture frame definition members are made from a light reducing material.

17. A picture frame switching mechanism according to claim 14, wherein:

a movable definition portion, which defines another side parallel to said side of said first picture frame and which can be shifted in said second direction, is provided to said first picture frame definition member; and

a third picture definition portion for defining in said central stopping position a side of said third picture frame prolonged in said first direction is provided to an edge portion of said encroaching position side of said second picture frame definition member, and comprising

a shifting mechanism which shifts said movable definition portion more towards a picture frame center when said second picture frame definition member has been shifted into said central stopping position than when said second picture frame definition member is in said withdrawn position or in said encroaching position.

18. A picture frame switching mechanism according to claim 17, wherein said shifting mechanism is constituted by a cam mechanism which is provided between said second picture frame definition member and said first picture frame definition member.

19. A picture frame switching mechanism according to claim 18, wherein said cam mechanism comprises a first cam which is swung in a direction in linked movement with shifting of said second picture frame definition member and which changes a swinging movement direction in reverse at said central stopping position, and a second cam which causes to and fro linked movement of said movable definition portion in said second direction in correspondence to said swinging movement direction of said first cam.

20. A picture frame switching mechanism, comprising:

a picture frame switching member which is inserted into an optical path of an optical system; and

a guide mechanism which guides said picture frame switching member according to a predetermined guiding order between a first position corresponding to a first picture frame which is of rectangular shape, a second position corresponding to a second picture frame which is squeezed only in a direction following along short sides of said first picture frame, and a third position corresponding to a third picture frame which is squeezed only in a direction following along long sides of said first picture frame, and which performs switching between said second position and said third position not via said first position.

21. A picture frame switching mechanism according to claim 20, wherein said optical system is a viewfinder optical system which is provided separately from a photographic optical system of a camera.

22. A picture frame switching mechanism according to claim 20, wherein said picture frame definition member is made from a light reducing material.

23. A picture frame switching mechanism according to claim 20, further comprising a drive member which is rotationally operated around a rotational axis line which is parallel to a direction of an optical axis of said optical system and which drives said guide mechanism, wherein said rotational axis line of said drive member is set outside said picture frame.

24. A picture frame switching mechanism according to claim 20, wherein said guide mechanism is formed so that: said picture frame switching member shifts between said first position and said third position via said second position; and positions of said picture frame switching member in said direction following along said short sides are the same for said first position and for said third position.

25. A picture frame switching mechanism according to claim 20, wherein said guide mechanism is formed so that: said picture frame switching member shifts between said first position and said second position via said third position; and positions of said picture frame switching member in said direction following along said long sides are the same for said first position and for said second position.

26. A picture frame switching mechanism comprising:

a picture frame definition member which is inserted into an optical path of an optical system and which defines a first picture frame of rectangular shape;

a picture frame switching member which includes a second picture frame defining edge parallel to long sides of said first picture frame and a third picture frame defining edge parallel to short sides of said first picture frame; and

a guide mechanism which guides said picture frame switching member according to a predetermined guiding order between a first position in which both said second picture frame defining edge and said third picture frame defining edge are withdrawn to outside of said first picture frame, a second position in which said second picture frame defining edge is encroached more to inside than the long sides of said first picture frame while said third picture frame defining edge is withdrawn to outside of said first picture frame, and a third position in which said third picture frame defining edge is encroached more to inside than the short sides of said first picture frame while said second picture frame defining edge is withdrawn to outside of said first picture frame, and which performs switching between said second position and said third position not via said first position.

27. A picture frame switching mechanism according to claim 26, wherein said guide mechanism is formed so that: said picture frame switching member shifts between said first position and said third position via said second position; and an amount of drawing back of said third picture frame defining edge from the short sides of said first picture frame is gradually reduced according to approaching from said first position to said second position.

28. A picture frame switching mechanism according to claim 26, wherein said guide mechanism shifts said picture frame switching member between said first position and said third position via said second position, and moreover is formed so that the positions of said picture frame switching member in a direction following along said short sides are almost the same for said first position and for said third position.

29. A picture frame switching mechanism according to claim 26, wherein said guide mechanism is formed so that: said picture frame switching member shifts between said first position and said second position via said third position; and positions of said picture frame switching member in a direction following along said long sides are almost the same for said first position and for said second position.

30. A picture frame switching mechanism comprising:

a picture frame switching member which is inserted into an optical path of an optical system and which switches between a plurality of picture frames;

a drive member which, in a state of being engaged with said picture frame switching member, is rotationally operated around a rotational axis which is set outside said picture frame and parallel to a direction of an optical axis of said optical system;

a guide mechanism which shifts said picture frame switching member between a plurality of positions respectively corresponding to said plurality of picture frames in linking with a rotation of said drive member; and a click mechanism which restricts said drive member into said plurality of positions respectively corresponding to said plurality of picture frames.

31. A picture frame switching mechanism according to claim 30, wherein said click mechanism is provided between a member which rotatably supports said drive member and said drive member.

32. A picture frame switching mechanism according to claim 4, wherein said linked driving section defines a first picture frame when said first definition member is in said first standard position and said second definition member is in said second standard position, defines a second picture frame when said first definition member is in said first standard position and said second definition member is closer to said optical axis than said second standard position, and defines a third picture frame when first definition

member is closer to said optical axis than said first standard position and said second definition member is in said second standard position.

33. A picture frame switching mechanism according to claim 13, wherein:

said guide member includes a drive member which drives said pair of picture frame definition members, and a guide plate which guides said pair of picture frame definition members;

each of said pair of picture frame definition members includes a projection portion;

said guide plate has guide grooves into which said projection portions are engaged;

each of said guide grooves successively has a first guide portion which displaces said pair of picture frame definition members in a direction parallel to said one side, and a second guide portion which displaces said pair of picture frame definition members in a direction perpendicular to said one side; and

said pair of picture definition members defines said first picture frame by being positioned in said predetermined standard position when said projection portions are in portions of said guide grooves intermediate between said first guide portions and said second guide portions, defines said second picture frame by being driven by said drive member so that said projection portions are shifted into said first guide portions, and defines said third picture frame by being driven by said drive member so that said projection portions are shifted into said second guide portions.

34. A camera comprising:

a variable magnification optical system in which a magnification of a viewfinder can be altered; and

a picture frame switchover member which is inserted into and removed from an optical path of said viewfinder so as to switch over a picture frame of said viewfinder, wherein

a region for retraction of said picture frame switchover member to outside said optical path is arranged in a direction perpendicular to an optical path of said variable magnification optical system with regard to an operation region for variable magnification of said variable magnification optical system.

35. A camera according to claim 34, wherein:

said viewfinder is a real image type viewfinder;

a real image surface of said viewfinder is provided in an image space side of said variable magnification optical system and in parallel to the optical axis of said variable magnification optical system; and

said picture frame switchover member is shifted in a direction parallel to said real image surface to switch over said picture frame.

36. A camera according to claim 34, wherein:

constructional elements other than constructional components of said viewfinder are arranged in the direction perpendicular to the optical axis of said variable magnification optical system with regard to said operation region for variable magnification; and

said region for retraction of said picture frame switchover member is set between said constructional elements and said variable magnification optical system.

37. A camera according to claim 34, wherein:

said constructional components of said viewfinder are assembled to a viewfinder block that is attachable to and detachable from a camera body; and

said region for retraction of said picture frame switchover member is set in a position outside said viewfinder block and adjacent to the operation region for variable magnification of said variable magnification optical system which is set inside said viewfinder block.

38. A camera according to claim 36, wherein said constructional elements are constructional components of a distance measurement means which measures a distance to an object to be photographed.

39. A camera according to claim 36, wherein a guide member which guides a shift element of said variable magnification optical system is arranged between said constructional elements and said operation region for variable magnification.

40. A viewfinder comprising a picture frame switching mechanism which is capable of switching over a viewfinder picture frame to a plurality of sizes, and in which a viewfinder optical system is contained within a viewfinder block, wherein,

said picture frame switching mechanism is inserted and fixed into a portion of said viewfinder block in a state that members which constitute said picture frame switching mechanism are temporarily assembled into a unit.

41. A viewfinder according to claim 40, wherein said picture frame switching mechanism comprises a focal point plate upon which an image of an object to be photographed is focused, a mask plate having a cam portion, a drive member which is rotationally driven for shifting said mask plate, a holding member for holding said focal point plate, and a pressure member which presses said mask plate by being assembled to this holding member with a predetermined gap therebetween.

42. A viewfinder according to claim 40, wherein:

said viewfinder is a real image type viewfinder; and

said picture frame switching mechanism is disposed in a vicinity of a real image plane of said real image type viewfinder.

43. A viewfinder according to claim 41, wherein:

said picture frame switching mechanism is temporarily assembled into a single unit by superimposing together and assembling said focal point plate, said mask plate, and said drive member between said holding member and said pressure member which is assembled to said holding member with a predetermined gap therebetween; and

said temporarily assembled picture frame switching mechanism is inserted and fixed into insertion portions which are provided in a pair of wall portions which are included in the viewfinder block.

44. A viewfinder in which a viewfinder optical system is held within a viewfinder block, produced by a process which comprises:

a step of temporarily assembling into a single unit members which constitute a picture frame switching mechanism which switches over a viewfinder picture frame to a plurality of sizes; and

a step of inserting and fixing said temporarily assembled picture frame switching mechanism into a portion of said viewfinder block.

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